Air Quality Permitting

Technical Memorandum

Tier II Operating Permit No. 011-00013

IDAHO SUPREME POTATOES, INC.
FIRTH, IDAHO

Project No. T2-010314

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Final Permit

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LIST OF ACRONYMS

ACFM	Actual Cubic Feet Per Minute
AFS	AIRS Facility Subsystem
AIRS	Aerometric Information Retrieval System
AQCR	Air Quality Control Region
BACT	Best Available Control Technology
CFR	Code of Federal Regulations
CO	Carbon Monoxide
DEQ	Idaho Department of Environmental Quality
dscf	Dry Standard Cubic Feet
EF	Emission Factor
EPA	United States Environmental Protection Agency
gpm	Gallons Per Minute
gr	Grain (1 lb = 7,000 grains)
HAPs	Hazardous Air Pollutants
IDAPA	Idaho Administrative Procedures Act
km	Kilometer
lb/hr	Pound Per Hour
MACT	Maximum Available Control Technology
MMBtu	Million British thermal units
NESHAP	Nation Emission Standards for Hazardous Air Pollutants
NO_2	Nitrogen Dioxide
NO_X	Nitrogen Oxides
NSPS	New Source Performance Standards
O_3	Ozone
OP	Operating Permit
PM	Particulate Matter
PM_{10}	Particulate Matter with an Aerodynamic Diameter of 10 Micrometers or Less
ppm	Parts Per Million
PSD	Prevention of Significant Deterioration
PTC	Permit To Construct
PTE	Potential To Emit
SCC	Source Classification Code
scf	Standard Cubic Feet
SIP	State Implementation Plan
SO_2	Sulfur Dioxide
TSP	Total Suspended Particulates
T/yr	Tons Per Year
µm	Micrometers
VOC	Volatile Organic Compound

PURPOSE

The purpose for this memorandum is to satisfy the requirements of IDAPA 58.01.01 Sections 404.04, *Rules for the Control of Air Pollution in Idaho* (*Rules*) for Tier II Operating Permits (OP) and to document the factual basis for issuing this operating permit.

PROJECT DESCRIPTION

This project is for the issuance of a Tier II OP for the Idaho Supreme Potatoes, Inc (Idaho Supreme Potatoes) Firth Facility located on the corner of Highway 91 and 800 Goshen Highway near Firth, Idaho. The Range-Township location is the northeast quarter of Section 25, Township 1 South, Range 36 East.

Idaho Supreme Potatoes is proposing to modify the main plant boiler (Boiler #4 – formerly designated as Boiler #1) and the Clever Brooks boiler (Boiler #3). Due to high natural gas prices, Idaho Supreme Potatoes is proposing to have the capability to burn Nos. 4, 5, and/or 6 residual fuel oil; natural gas; propane; and/or No. 2 distillate fuel oil.

In addition, Idaho Supreme Potatoes wishes to permit a fluidized bed dryer. The fluidized bed dryer was previously exempted from permitting based on an hourly operational limit. Idaho Supreme Potatoes wishes to increase the operational hours of the dryer.

Idaho Supreme Potatoes was previously issued a Tier II OP in December 1998. This OP expired in January 2001. In addition to the boilers, other permitted equipment included a primary dryer consisting of three sections (Dryer Stages A, B, and C), a secondary dryer, three industrial space heaters, other miscellaneous space heaters, storage silos, and flaker lines. This equipment will be included in a revised Tier II OP.

SUMMARY OF EVENTS

On September 17, 2001, the Idaho Department of Environmental Quality (DEQ) received a permit to construct (PTC) application from Idaho Supreme Potatoes for an increase in hours of operation for the fluidized bed dryer and for the ability to burn alternative fuels in boilers at the Idaho Supreme Potatoes Firth facility.

On October 29, 2001, DEQ conveyed to Idaho Supreme Potatoes's consultant, via a phone conversation, that DEQ will issue a renewed and revised Tier II OP. The Tier II OP will serve as the PTC for the facility. On November 14, 2001, DEQ issued a letter indicating the permit application was incomplete. On December 17, 2001, DEQ issued a letter indicating the permit application was complete.

A proposed permit was issued by DEQ for public comment between March 1, 2002 and April 1, 2002. The response to these comments is presented in Appendix A of this memorandum.

DISCUSSION

1. Process Description

Idaho Supreme Potatoes is a potato processing company. The process primarily involves potato dehydration to make potato flakes. A brief description of the process is presented below.

Main Process Line

- The potatoes arrive at the plant on trucks, then are unloaded across pilers; deposited in temporary storage bins; transported from the bins; washed with cold water; and conveyed to a tare removal table where rot, sticks, and other debris are removed.

- The potatoes are transferred to a steam peeler and exposed to steam. Steam is exhausted and quenched in a water bath.
- The peel is fully removed by dry and wet scrubbing using revolving brushes and/or water sprays. Waste products from this portion of the process are used for cattle feed.
- Peeled potatoes are transferred to a trim table where defective parts and the remaining peel are removed.
- The potatoes are held in a surge bin and released at a metered rate for proper slicing. Sliced potatoes are pumped to pre-cookers or blanchers.
- The potatoes are then cooled to retrograde the starch gelatinization, water transported into cookers, and exposed to atmospheric steam until fully cooked.
- The potatoes are then forced through slots, broken into smaller pieces, and added to dehydration rolls.
- The mashed/dehydrated potatoes are spread across the face of drum dryers with five applicator rolls. The steam drum dryer rotates and drives moisture from the potato cells. Excess moisture is removed by a steam snifter fan.
- The dried potato sheet is cut off the drum and broken into smaller pieces. Good flake is transferred to mills, cut into desired particle size and density, and transported to product separation baghouses.
- The flake is then bagged and placed into large totes for storage and transport, reblended for texture and quality, or sent to silos for storage.

The "C line" process (an additional process line) flow is identical to the main process.

Slice Line

- The slice line process follows the main line process until the pre-cooker/blancher stage.
- After precooking/blanching, the slices are blown down or up to dehydrate the slices to a shelf stable product.
- The slices are piled in various thicknesses in Dryer Stages A, B, and C. The slices are then sorted and shipped in bags or totes.
- The slices may be finished or dried in the secondary dryer or used as byproduct for dog food.

2. Equipment Listing

The following equipment is being added or modified:

- Boiler #4: Bigelow boiler with Coen 200 Series CSI nitrogen oxide (NO_x) Mixer Size 34 burner.

  Stack Parameters:
  Height: 50 feet — Exit Gas Volume: 32,000 actual cubic feet per minute (acfm)
  Exit Diameter: 3 feet — Exit Gas Temperature: 375 °F

- Boiler #3: Cleaver Brooks Model WT200X-BR3.

  Stack Parameters:
  Height: 36 feet — Exit Gas Volume: 13,000 acfm
  Exit Diameter: 2.89 feet — Exit Gas Temperature: 550 °F

- Fluidized Bed Dryer: A BD21X3 fluidized bed dryer fired by two Maxon 435 Oven Pak II burners. Ancillary equipment includes a mixer vessel, miscellaneous tanks and pumps for liquid ingredients, enclosed conveyors for product transportation, and bulk bagging station for product collection.

  Stack Parameters:
  Height: 40 feet — Exit Gas Volume: 26,000 acfm
  Exit Diameter: 1.41 feet — Exit Gas Temperature: 120 °F

The other equipment at the facility is not being modified, nor are operational hour increases requested for other equipment. A complete equipment listing including stack parameters is presented in Appendix B.

In addition to the equipment listed in Appendix B, the facility utilizes one portable 16,000-gallon aboveground storage tank (AST) containing fuel oil; two 30,000-gallon ASTs containing fuel oil; one 10,000-gallon AST and one 20,000-gallon AST containing diesel fuel; and one 30,000-gallon AST containing propane.

3. Emissions Estimates

Air pollution emission rates from fuel burning equipment were calculated using United States Environmental Protection Agency (EPA) Air Pollution Emission Factors (AP-42 emissions factors). Listed below are hourly and annual emissions of criteria pollutants from all emission sources at the facility operating at full capacity. Criteria pollutants include NO_x, sulfur dioxide (SO_2), particulate matter with an aerodynamic diameter of 10 micrometers or less (PM_{10}), carbon monoxide (CO), and lead. Emissions of toxic air pollutants (TAPs) were also calculated using AP-42 emission factors. Please refer to Appendix C for details regarding the ambient air concentration calculations. Appendix C also includes assumptions regarding hours of operation and equipment operating parameters.

In addition to fuel-burning equipment, particulate matter (PM) and PM_{10} are emitted from material processing and handling operations at the facility. Aggregate dehydration process emissions of PM were based on a mass balance previously completed by Idaho Supreme Potatoes. The results of the mass balance were originally submitted to DEQ in April 1995. The maximum PM emissions identified were approximately 0.00995% of the raw potato throughput. The facility did not request a change to the potato throughput capacity; therefore, the throughput limits were established as 72,338 pounds per hour and 287,000 tons per year as previously established in the Tier II OP issued in December 1998. Based on these throughputs, PM emissions are 7.19 pounds per hour and 28.6 tons per year.

The mass balance discussed above established PM emission rates from potato processing; however, no emissions factors for PM_{10} from potato dehydration processing are reported in AP-42. Therefore, to estimate PM_{10} emissions, it was assumed that the process is most similar to cereal drying. Emission factors for cereal drying in AP-42 indicate PM_{10} emissions are approximately 44% of PM emissions. Based on this assumption, PM_{10} emissions are 3.2 pounds per hour and 12.6 tons per year from all 12 flaker lines.

In addition, PM is also emitted from 10 storage silos at the facility. The PM emissions from each silo are controlled by a baghouse filter. No change to the throughputs was requested; therefore, the emission limits have not changed from the previous Tier II OP. The PM emissions limits for the previous Tier II OP were 0.064 pounds per hour per silo. It was assumed that all PM was emitted as PM_{10}.

The facility requested an emission limit for the aggregate dehydration process (the dehydration line, storage silos, and process emissions from the secondary dryers and Dryers A, B, and C) of 14.5 pounds per hour of PM and 6.4 pounds per hour of PM_{10}. The modeled emission rate for PM_{10} from the aggregate dehydration process was 7.0 pounds per hour.

Table 1. Facility-wide Emission Estimates of Criteria Pollutants

Process Description	PM_{10}[1]		SO_2[2]		NO_x[3]		CO[4]		Lead		VOCs[7]
	lb/hr[5]	T/yr[6]	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr	T/yr
#4 Boiler	7.5	32.8	51.0	223.4	31.0	135.8	11.0	48.2	0.001	0.004	3.3
#3 Boiler	2.3	3.7	15.7	25.0	11.0	17.5	3.5	5.6	0.0004	0.0006	0.41
Fluidized Bed Dryer	0.8	3.3	0.004	0.02	1.1	4.8	0.6	2.5	0.000003	0.00001	0.18
Other Natural Gas Sources	0.4	1.2	0.03	0.1	4.5	15.2	4.0	13.6	0.00002	0.0001	1.3
Dehydration Process	6.4	22.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FACILITY TOTALS	**17.4**	**63.0**	**66.7**	**248.5**	**47.6**	**173.3**	**19.1**	**69.9**	**0.001**	**0.005**	**5.1**

1. PM_{10} = condensable and filterable particulate matter.
2. SO_2 = sulfur dioxide
3. NO_x = nitrogen oxides
4. CO = carbon monoxide
5. lb/hr = pounds per hour; emissions rates represent maximum hourly emissions from simultaneous operation of both generators.
6. T/yr = Tons per year; emissions rates represent maximum annual emissions from both generators.
7. VOCs = volatile organic compounds

Emissions from the #4 Boiler, #3 Boiler, and the fluidized bed dryer were evaluated burning Nos. 4, 5, and 6 residual fuel, No. 2 distillate fuel oil, natural gas, and propane. The emissions reported in Table 1 represent the maximum emissions from the boilers and fluidized bed dryer. A complete summary of emissions is presented in Appendix C.

In addition, emission rates were calculated from the two 12,000-gallon ASTs at the facility using EPA's Tanks 4.0 volatile organic chemical (VOC) emission calculation program. A copy of the program's output is presented in Appendix D. Total annual VOC emissions from both ASTs were calculated to be 9.82 pounds per year. Emissions from the ASTs were negligible; therefore, emissions from the ASTs are not regulated in the OP.

4. Modeling

Idaho Supreme Potatoes used the ISCST3 model, an approved regulatory model, to assess the ambient air quality impacts. The operating scenario modeled was for process equipment at the facility operating at full capacity as worst case. All sulfur oxide (SO_x) and NO_x emissions were modeled assuming that all SO_x was emitted as SO_2 and all NO_x was emitted as nitrogen dioxide (NO_2). These are worst-case assumptions. The ambient impacts from operation of the Firth facility are given in Table 2 below.

Table 2. Criteria Air Pollutant Ambient Impacts

	SO_2[1]			PM_{10}[2]		CO[3]		NO_2[4]	Lead
	3-Hour (µg/m³)[5]	24-Hour (µg/m³)	Annual (µg/m³)	24-Hour (µg/m³)	Annual (µg/m³)	1-Hour (µg/m³)	8-Hour (µg/m³)	Annual (µg/m³)	Quarterly (µg/m³)
A	424.93	121.22	11.95	50.45	9.50	282.3	81.5	11.83	0.0023
B	545	144	23.5	86	32.7	11,450	5,130	40	0.15
C	970	265	35	136	42	11,732	5,212	52	0.15
D	1,300	365	80	150	50	40,000	10,000	100	1.5

A. Modeled Ambient Concentration
B. Background Concentration
C. Modeled Ambient Concentration plus Background Concentration
D. National Ambient Air Quality Standards (NAAQS) for SO_2, PM_{10}, NO_2, and CO
1. SOx = sulfur dioxide
2. PM_{10} = particulate matter with an aerodynamic mean diameter of 10 micrometers or less
3. CO = carbon monoxide
4. NO_2 = nitrogen dioxide
5. µg/m3 = micrograms per cubic meter.

Emissions of TAPs from the generators were evaluated and determined to be below the state standards or within acceptable risk criteria. Emissions of cobalt, fluoride, and phosphorus were greater than the toxic screening levels listed in IDAPA 58.01.01.585, and emissions of arsenic, beryllium, cadmium, chromium (VI), formaldehyde, nickel, and polyaromatic hydrocarbons (PAHs) were greater than the toxic screening levels listed in IDAPA 58.01.01.586. The emission rates for each of the other toxic air pollutants emitted by the generators were below screening thresholds specified by IDAPA 58.01.01.585 and 586. Refined modeling was conducted to determine ambient concentrations of the chemicals for which emissions exceeded corresponding screening thresholds. All impacts were found to be below acceptable ambient concentrations (AACs) and acceptable cumulative risk factors.

A discussion of the modeling results used to establish the ambient impacts of the generators at this site may be seen in Appendix E, and a more detailed discussion is included in Section 6 of this memorandum.

5. Facility Classification

The Idaho Supreme Potatoes Firth facility is a major facility as defined in IDAPA 58.01.01.006.55. It is a not a designated facility as defined in IDAPA 58.01.01.006.27. The Standard Industrial Classification code is 2034–Dried and Dehydrated Fruits, Vegetables, and Soup Mixes; "Establishments engaged in sun drying or artificially dehydrating fruits and vegetables, or in manufacturing packaged soup mixes from dehydrated ingredients."[1]

The Aerometric Information Retrieval System (AIRS) facility classification is "A" because the actual or controlled potential to emit is greater than 100 tons per year. The project is not subject to Potential of Significant Deterioration (PSD) requirements since the potential to emit is less than the PSD major source threshold of 250 tons per year for any one regulated pollutant located in an attainment or unclassifiable area.

[1] Standard Industrial Classification Manual, Executive Office of the President, Office of Management and Budget, 1987.

6. Area Classification

The facility is located within Bingham County in the northern portion of the Pocatello regional district. Bingham County is designated as an unclassifiable area for all regulated criteria air pollutants. Bingham County is located in Air Quality Control Region 61 and Zone 12.

7. Regulatory Review

This OP is potentially subject to the following permitting requirements:

IDAPA 58.01.01.006.55.a.i Major Facility

A major facility is defined as any facility that emits, or has the potential to emit, 100 tons per year or more of any regulated air pollutant. Idaho Supreme Potatoes has requested a permitted emission limit of 249 tons per year of SO_2 and 178 tons per year of NO_x, both regulated air pollutants, from the Firth facility. Therefore, the Idaho Supreme Potatoes's Firth facility is defined as a major facility.

IDAPA 58.01.01.161 Toxic Substances

Toxic substances shall not be emitted in such quantities or concentrations as to alone, or in combination with other contaminants, injure or unreasonably affect human or animal life or vegetation. Compliance with this standard was demonstrated through facility-wide modeling discussed in Appendix E of this memorandum.

IDAPA 58.01.01.401.03.a Tier II Operating Permits Required by the Department

A Tier II OP was required for the ISUP by DEQ to attain or maintain ambient air quality standards.

IDAPA 58.01.01.402 Application Procedures

A Tier II OP was requested by DEQ for the facility to establish facility-wide requirements to limit the facility's potential to emit below Prevention of Significant Deterioration emission rates and to comply with ambient air quality standards in accordance with *Rules for the Control of Air Pollution in Idaho.*

IDAPA 58.01.01.403 Permit Requirements for Tier II Sources

The Idaho Supreme Potatoes Firth facility demonstrated compliance with local, state, and federal emission standards and NAAQS as required in IDAPA 58.01.01.403. See Tables 1 and 2 above and Appendices B and D of this memorandum.

IDAPA 58.01.01.406 Obligation to Comply

The facility is required to comply with all applicable local, state, and federal rules and regulations.

IDAPA 58.01.01.470 Permit Application Fees for Tier II Permits

The facility is required to submit a permit application fee of $500.

IDAPA 58.01.01.510 – 516 Stack Heights and Dispersion Techniques

The provisions of IDAPA 58.01.01.510 through 516 do not apply to stack heights in existence on or before December 31, 1970. The generators were constructed in 1967; therefore, they are not subject to the provisions in Sections 510 through 516.

IDAPA 58.01.01.577 Ambient Air Quality Standards For Specific Air Pollutants

Emissions of pollutants listed in IDAPA 58.01.01.577 were shown to be in compliance with the Ambient Air Quality Standards. See Table 2 above and Appendix E.

IDAPA 58.01.01.625 Visible Emissions

The facility will not discharge any pollutant into the atmosphere for a period or periods aggregating more than three minutes in any 60-minute period which is greater than 20% opacity as determined by EPA Test Method 9.

IDAPA 58.01.01.650 Rules For Control Of Fugitive Dust

The facility is required to take all reasonable precautions to prevent the generation of fugitive dust.

IDAPA 58.01.01.677 Standards For Minor And Existing Sources

The facility shall not discharge into the atmosphere from any fuel burning equipment in operation prior to October 1, 1979, PM in excess of 0.050 grains per dry standard cubic foot (gr/dscf) corrected to 3% oxygen when burning liquid fuel, and 0.015 gr/dscf when burning gaseous fuel.

Both liquid and gaseous fuels are burned at the facility in a variety of equipment. Appendix F of this memorandum contains a combustion analysis (based on the maximum amount of fuel that can be combusted in the equipment per hour) that demonstrates compliance with this standard with one exception. When burning #5 residual oil in either Boiler #4 or Boiler #3, the PM emissions will slightly exceed the standard of 0.050 gr/dscf. The PM emissions are based on AP-42 emission factors, which are generally conservative. Therefore, a source test is required for both boilers when combusting #5 residual oil to determine actual PM emissions and compliance with the fuel burning standard.

IDAPA 58.01.01.701 Particulate Matter – New Equipment Process Weight Limitations

The facility operates 12 process dehydration lines and 10 storage silos that are individual sources of PM emissions. Based on the mass balance discussed in Section 3 of this memorandum, the emissions to process rate ratio (E/PW) for the dehydration lines is 0.0000995. Two equations for determining PM emissions are given in IDAPA 58.01.01.701:

Equation 1:	$E = 0.045(PW)^{0.60}$	0<PW<9,250
Equation 2:	$E = 1.10(PW)^{0.25}$	9,250<PW

Where E is the emissions rate and PW is the process throughput, both in pounds per hour. These equations can be rearranged to give the E/PW ratio.

Equation 1a:	$E/PW = 0.045(PW)^{-0.4}$	0<PW<9,250
Equation 2a:	$E/PW = 1.10(PW)^{-0.75}$	9,250<PW

Substituting the maximum value for PW of 9,250 lb/hr in Equation 1a, and the maximum throughput (72,338 lb/hr) into Equation 2a, the results are:

E/PW = 0.0017	(Equation 1a)
E/PW = 0.000294	(Equation 2a)

By comparison, these values are less than the E/PW values determined by the mass balance performed by Idaho Supreme Potatoes (0.0000995); therefore, the facility is in compliance with the process weight limitations.

The permit application indicated the maximum throughput through each storage silo is 9,600 lbs/hr. Each storage silo has an associated baghouse filter. Equation 2 gives a maximum emission rate of 10.9 lbs/hr based on process weight limitations. Based on the presence of the baghouse filter and the relatively low throughput, it is reasonable to assume the maximum emissions from the storage silos will be less than the emission rate established using Equation 2.

The process weight emission limit is not established as an enforceable permit condition because the permitted emissions limits are less than the limits established by the process weight equations.

IDAPA 58.01.01.727 and .7288 Fuel Oil Sulfur Content

The facility will not use any No. 1 distillate fuel oil with a sulfur content of greater than 0.3% by weight, No. 2 distillate fuel oil with a sulfur content of greater than 0.5% by weight, or residual fuel oil with a sulfur content of greater than 1.75% sulfur by weight.

40 CFR 60.40b Subpart Db Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units

Boiler #4 at the ISUP facility is subject to the New Source Performance Standard (NSPS) 40 CFR 60.40b. The emissions requirements of Subpart Db are summarized below. Monitoring, recordkeeping, and reporting requirements are presented in the Tier II OP.

60.40b(a): Subpart Db applies to steam generating units that have a heat input capacity of greater than 100 MMBtu/hr. The maximum steam generating capacity of Boiler #4 is approximately 140 MMBtu/hr; therefore, Subpart Db is applicable.

60.42b(j): By combusting only very low sulfur oil, ISUP will comply with the sulfur dioxide standards of 60.42b. Very low sulfur oil is defined as oil that contains no more than 0.5 weight % sulfur or that, when combusted without controls, has a sulfur dioxide emission rate equal to or less than 0.5 lb/MMBtu heat input.

60.43b(f): Opacity shall not exceed 20% (six-minute average), except for one six-minute period per hour of not more than 27% opacity. This standard applies at all times, except during periods of startup, shutdown, or malfunction as provided in 60.43b(g).

60.44b(a): The NO_x emissions at the facility shall not exceed:
0.40 lb/MMBtu heat input for burning residual fuel at high heat release rate;
0.30 lb/MMBtu heat input for burning residual fuel at low heat release rate;
0.20 lb/MMBtu heat input for burning diesel fuel and natural gas at high heat release rate; and
0.10 lb/MMBtu heat input for burning diesel fuel and natural gas at low heat release rate.
This standard applies at all times, including periods of startup, shutdown, or malfunction, and compliance is determined on a 30-day rolling average as provided in 60.44b(h) and 60.44b(i).

40 CFR 60.40c Subpart Dc Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units

Boiler #3 at the Idaho Supreme Potatoes facility is subject to the New Source Performance Standard (NSPS) 40 CFR 60.40c. The emissions requirements of Subpart Dc are summarized below. Monitoring, recordkeeping, and reporting requirements are presented in the Tier II operating permit.

60.40c(a): Subpart Dc applies to steam generating units that have a heat input capacity of greater than or equal to 10 MMBtu/hr but less than 100 MMBtu/hr. The maximum steam generating capacity of Boiler #3 is approximately 43 MMBtu/hr; therefore, Subpart Dc is applicable.

60.42c(d): To comply with the SO_2 standard, Idaho Supreme Potatoes will not burn oil with a sulfur content greater than 0.5% by weight. Compliance with the fuel oil sulfur limit is based on a 30-day rolling average as provided in 60.42c(g).

60.43c(c): Opacity shall not exceed 20% (six-minute average), except for one six-minute period per hour of not more than 27% opacity. This standard applies at all times, except during periods of startup, shutdown, or malfunction as provided in 60.43c(d).

40 CFR 60.110b Subpart Kb Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for which Construction, Reconstruction, or Modification Commenced After July 23, 1984

The facility is equipped with one 10,000-gallon AST, one 16,000-gallon AST, one 20,000-gallon AST, and two 30,000-gallon ATSs. The ASTs contain either distillate or residual fuel oil. The following portions of 60.110b apply to the ASTs at the Idaho Supreme Potatoes facility.

60.110b(b) and (c): Storage vessels with a capacity of less than approximately 19,800 gallons and storage vessels with a capacity of greater than about 19,800 gallons and less than about 40,000 gallons and with a maximum true vapor pressure of less 15 kilopascals (kPa) are exempt from the general provisions of 40 CFR 60 and from most of the portions of Subpart Kb. The three ASTs greater than 19,800 gallons in storage capacity contain liquids with a vapor pressure less than 15 kPa. Therefore, the ASTs at the facility qualify for the exemptions. The remaining applicable sections are discussed below.

60.116b(b): The facility will keep readily accessible records showing the dimensions of the ASTs and an analysis showing the capacity of the ASTs. These records will be kept at the facility for the life of the ASTs as provided in 60.116b(a).

8. Permit Requirements

In addition to the requirements identified in this section, emissions limits, operating requirements, and monitoring and recordkeeping requirements are established for Boiler #3, Boiler #4, and the storage tanks at the facility by NSPS. These requirements are discussed in Section 6 of this memorandum, and are not discussed in this section.

8.1 Emission Limits

Emission limits on specific air pollutants emitted from Boiler #3, natural gas burning equipment, and the dehydration processes are required to limit potential SO_2 emissions to below PSD levels and to ensure compliance with the PM_{10} 24-hour and annual NAAQS. Emissions from Boiler #4, and emissions of NO_x and CO from Boiler #3 and natural gas burning equipment, are provided in the permit for the purpose of managing air quality. The emissions rates listed in the Tier II OP appendix are estimated maximum emissions from the facility when operated at there potential to emit including operational limitations.

8.2 Operating Requirements

The permittee shall combust residual oil with a fuel content of 0.5% or less in any fuel burning equipment.

The permittee shall not combust in Boiler #4 residual oil with a nitrogen content greater than 0.3%.

The permittee shall operate Boiler #3 for a period not to exceed 3,185 hours per consecutive 12-month period.

The permittee shall operate the three industrial space heaters and miscellaneous space heaters for a period not to exceed 6,048 hours each per consecutive 12-month period.

The combined maximum amount of natural gas burned in Dryers A, B, C, and the secondary dryer shall not exceed 53,000 standard cubic feet per hour (scf/hr) on average per day. The combined maximum amount of LPG burned shall not exceed 253 gallons per hour on average per day.

The combined maximum amount of natural gas burned in the industrial space heaters shall not exceed 41,235 scf/hr on average per day. The combined maximum amount of LPG burned shall not exceed 174 gallons per hour on average per day.

The total clean raw potatoes processed shall not exceed a rate of 868 tons per day, nor shall it exceed 287,000 tons per year for any consecutive 12-month period.

The total throughput through each storage silo shall not exceed 1,152 tons per day.

8.3 Monitoring, Recordkeeping, and Reporting Requirements

The permittee is required to report the results of all required performance test.

The permittee shall monitor the consecutive 12-month period operational hours of Boiler #3.

The permittee shall record the amount of hours each industrial space heater is operated per consecutive 12-month period, and record the amount of natural gas and LPG used from the fluidized bed dryer, Dryers A, B, C, secondary dryer, and industrial space heater per day.

The permittee shall record the calendar date and the daily and consecutive 12-month period throughput of each potato process line in operation, and the daily throughput of each storage silo.

9. AIRS

AIRS/AFS[1] FACILITY-WIDE CLASSIFICATION[2] DATA ENTRY FORM

AIR PROGRAM POLLUTANT	SIP[3]	PSD[4]	NSPS[5] (Part 60)	NESHAP[6] (Part 61)	MACT[7] (Part 63)	Title V	Area Classification (A = Attainment, U = Unclassified, N = Nonattainment)
SO_2[8]	A		A			A	A
NO_x[9]	A		A			A	A
CO[10]	B						A
PM_{10}[11]	B						A
PM[12]	B		B				
VOC[13]	B		B				A
Total HAPs[14]	B						
			APPLICABLE SUBPART				
			Db, Dc, Kb				

1. Aerometric Information Retrieval System (AIRS) Facility Subsystem (AFS)
2. AIRS/AFS CLASSIFICATION CODES:
   - A = Actual or potential emissions of a pollutant are above the applicable major source threshold. For NESHAP only, class "A" is applied to each pollutant which is below the 10 ton-per-year (T/yr) threshold, but which contributes to a plant total in excess of 25 T/yr of all NESHAP pollutants.
   - SM = Potential emissions fall below applicable major source thresholds if and only if the source complies with federally enforceable regulations or limitations.
   - B = Actual and potential emissions below all applicable major source thresholds.
   - C = Class is unknown.
   - ND = Major source thresholds are not defined (e.g., radionuclides).
3. State Implementation Plan
4. Prevention of Significant Deterioration
5. National Emission Standards for Hazardous Air Pollutants
6. New Source Performance Standards
7. Maximum Achievable Control Technology
8. Sulfur Dioxide
9. Nitrogen Oxides
10. Carbon Monoxide
11. Particulate matter with an aerodynamic diameter less than or equal to a nominal ten micrometers
12. Particulate Matter
13. Volatile Organic Compounds
14. Hazardous Air Pollutants

VE/FE/FD (Visible Emissions, Fugitive Emissions, and Fugitive Dust) are entered for compliance purposes only and do not require evaluation by the permit engineer.

FEES

The facility has paid the required $500.00 Tier II fee in accordance with IDAPA 58.01.01.470. This Tier II permt changes the facility classification to a major facility, therefore, this facility is required to register and pay fees in accordance with IDAPA 58.01.01.525.

RECOMMENDATIONS

Based on the review of the application materials and all applicable state and federal regulations, staff recommends that DEQ issue a final Tier II OP to the Idaho Supreme Potatoes, Inc. Firth facility. A public comment period was provided on the proposed permit and comments were evaluated.

MJS:tk G:\AIR PERMITS\T 2\ID SUPREME POTATOES\REVISED FINAL PERMIT\T2-010314 TECH MEMO.DOC

cc: Sherry Davis, Technical Services
Tiffany Floyd, Pocatello Regional Office
Joan Lechtenberg, Air Quality Division

APPENDIX A

IDAHO SUPREME POTATOES, INC.

FIRTH FACILITY

RESPONSE TO COMMENTS

April 2, 2002

STATE OF IDAHO
DEPARTMENT OF ENVIRONMENTAL QUALITY
RESPONSE TO PUBLIC COMMENTS
ON DRAFT AIR QUALITY TIER II OPERATING PERMIT
FOR IDAHO SUPREME POTATOES, INC., FIRTH, IDAHO

Introduction

As required by IDAPA 58.01.01.404 (*Rules for the Control of Air Pollution in Idaho*), the Idaho Department of Environmental Quality (DEQ) provided for public comment on the Tier II operating permit drafted for Idaho Supreme Potatoes, Inc.'s (ISUP's), Firth, Idaho facility. Public comment packages, which included the application materials, a proposed permit, and technical memorandum, were made available for public review at the Blackfoot Public Library in Blackfoot, Idaho, DEQ's Pocatello Regional Office, DEQ's State Office in Boise, and DEQ's Web site. The public comment period was provided from March 1, 2002 through April 1, 2002. Comments regarding the air quality aspects of the draft permit are provided below with DEQ's response immediately following. No entity requested a public hearing.

Public Comments and DEQ Responses

Comment 1: **Operational Throughputs**

A comment was submitted to adjust the time frames of the operational throughput limits listed in permit condition 6.3 of the Tier II operating permit. The comment suggested changing the hourly throughput limit to a daily throughput limit on a monthly average. The comment also suggested aggregating the throughput of the storage silos and changing the hourly throughput limit to a daily throughput limit on a monthly average.

Response to 1: The operational limits established in permit condition 6.3 of the Tier II operating permit are necessary to limit emissions of particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers (PM_{10}) to protect the National Ambient Air Quality Standards (NAAQS) for PM_{10}. The primary and secondary NAAQS for PM_{10} are based on a 24-hour period and an annual period. It is appropriate to establish operating limits based on a 24-hour period (i.e. daily). However, it is inappropriate to average the monthly throughputs to determine compliance with the daily standard. There would exist a potential to exceed the 24-hour PM_{10} NAAQS within the month, yet still be in compliance with the operational limit daily operational throughput limit when averaged for the month. Therefore, permit condition 6.3 was changed to state:

"The total clean raw potatoes processed shall not exceed a rate of 868 tons per day, nor shall it exceed 287,000 tons per consecutive 12-month period.

The total aggregate throughput of the ten storage silos shall not exceed 1,152 tons per day."

Although the throughput limit of the silos was aggregated instead of establishing a limit for each silo, the maximum potential emissions from the silo will remain unchanged.

Comment 2: **Monitoring and Recordkeeping**

A comment was submitted to adjust the time frames of the monitoring and recordkeeping required in permit condition 6.4 of the Tier II operating permit.

Response to 2: The suggested time frame for monitoring and recordkeeping requirements established in permit condition 6.4 of the Tier II operating permit would be consistent with the operational throughput limits established in permit condition 6.3. Therefore permit condition 6.4 was

changed to state:

"The permittee shall record the calendar date and the daily and consecutive 12-month period throughput of each potato process line in operation, and the daily aggregate throughput of the storage silos to verify compliance with Permit Condition 6.3. The records shall be kept at the facility for a minimum period of five years and shall be made available to Department representatives upon request."

APPENDIX B

IDAHO SUPREME POTATOES, INC.

FIRTH FACILITY

STACK LISTING

APPENDIX A. EQIUPMENT LISTING

EQUIPMENT	MODEL	STACK HEIGHT (ft)	EXIT TEMP (°F)	EXIT VELOCITY (fpm)	STACK DIAMETER (ft)	TYPE OF EMISSION CONTROL	CAPACITY
Fluidized Bed Dryer	BD21x3 w/ Maxon 435 Oven Pak II	8.6	321.00	26,000	0.43	None	7 MMBTU/hr
#4 Boiler	Bigelow	12.29	463.56	32,000	0.91	Low NOx	140 MMBTU/hr
#3 Boiler	Cleaver Brooks WT200X-BR3	9.68	560.78	13,000	0.88	Low NOx	43 MMBTU/hr
Dryer, Stage A	National Maxon NP-1	7.99	366.33	8,500	0.70	None	8 MMBTU/hr
Dryer, Stage B	National Maxon NP-1	7.99	366.33	7,500	0.70	None	3.2 MMBTU/hr
Dryer, Stage C	National Maxon NP-1	7.99	366.33	8,500	0.70	None	3.2 MMBTU/hr
Secondary Dryer (two identical vents)	Maxon 405 Ovenpak	7.68	293.00	7,000	0.76	None	0.55 MMBTU/hr
Space Heater South	Maxon NP-1	7.62	310.78	70,000	Not Applicable	None	8.25 MMBTU/hr
Space Heater North	Maxon NP-1	7.62	310.78	70,000	Not Applicable	None	8.25 MMBTU/hr
Space Heater East	Maxon NP-1	7.62	310.78	70,000	Not Applicable	None	15.4 MMBTU/hr
Misc. Space Heaters	Various				Not Applicable	None	2 MMBTU/hr
Storage Silo A	Not Applicable	22.43	293.00	750	6"	Baghouse; Dust Control EQ Model No. VS-10-KS1	9,600 pounds per hour
Storage Silo B	Not Applicable	22.43	293.00	750	6"	Baghouse; Dust Control EQ Model No. VS-10-KS1	9,600 pounds per hour
Storage Silo C	Not Applicable	22.43	293.00	750	6"	Baghouse; Dust Control EQ Model No. VS-10-KS1	9,600 pounds per hour
Storage Silo D	Not Applicable	22.43	293.00	750	6"	Baghouse; Dust Control EQ Model No. VS-10-KS1	9,600 pounds per hour
Storage Silo E	Not Applicable	22.43	293.00	750	6"	Baghouse; Dust Control EQ Model No. VS-10-KS1	9,600 pounds per hour
Storage Silo F	Not Applicable	22.43	293.00	750	24" x 24"	Baghouse; Dust Control EQ Model No. VS-10-KS1	9,600 pounds per hour
Storage Silo G	Not Applicable	22.43	293.00	750	30" x 45"	Baghouse; Dust Control EQ Model No. VS-10-KS1	9,600 pounds per hour
Storage Silo H	Not Applicable	22.43	293.00	750	30" x 45"	Baghouse; Dust Control EQ Model No. VS-10-KS1	9,600 pounds per hour
Storage Silo I	Not Applicable	22.43	293.00	750	30" x 45"	Baghouse; Dust Control EQ Model No. VS-10-KS1	9,600 pounds per hour

APPENDIX A. EQUIPMENT LISTING (continued)

EQUIPMENT	MODEL	STACK HEIGHT (ft)	EXIT TEMPERATURE (°F)	EXIT FLOW RATE (acfm)	STACK DIAMETER (ft)	CONTROL EQUIPMENT	CAPACITY
Storage Silo J	Not Applicable	22.43	293.00	750	30" x 45"	Baghouse; Dust Control EQ Model No. VS-10-KS1	9,600 pounds per hour
Flaker # 1	Not Applicable	7.37	293.00	9,935	1.14	None	Not Provided[2]
Flaker # 2	Not Applicable	7.37	293.00	9,935	1.14	None	Not Provided[2]
Flaker # 3	Not Applicable	7.37	293.00	9,935	1.14	None	Not Provided[2]
Flaker # 4	Not Applicable	7.37	293.00	11,039	1.14	None	Not Provided[2]
Flaker # 5	Not Applicable	7.68	293.00	10,333	0.63	None	Not Provided[2]
Flaker # 6	Not Applicable	8.29	293.00	10,793	0.76	None	Not Provided[2]
Flaker # 7	Not Applicable	8.29	293.00	9,812	0.76	None	Not Provided[2]
Flaker # 8	Not Applicable	8.29	293.00	16,190	0.76	None	Not Provided[2]
Flaker # 9	Not Applicable	9.83	293.00	10,625	0.61	None	Not Provided[2]
Flaker # 10	Not Applicable	8.93	293.00	10,000	0.61	None	Not Provided[2]
Flaker # 11	Not Applicable	9.83	293.00	8,750	0.61	None	Not Provided[2]
Flaker # 12	Not Applicable	9.83	293.00	10,000	0.61	None	Not Provided[2]

Notes: 1. Capacity listed in MMBTU/hr based on natural gas burning.
2. Capacity identified as confidential information.

APPENDIX C

IDAHO SUPREME POTATOES, INC.

FIRTH FACILITY

EMISSIONS CALCULATIONS

CRITERIA POLLUTANTS

TABLE 1. MAXIMUM HOURLY EMISSION RATES
(pounds per hour)

Process	PM-10	SO2	NO2	CO	F	Pb
Fluidized Bed Dryer	7.6E-01	4.E-03	1.1E+00	5.7E-01	0	3.E-06
Boiler #4	7.48E+00	5.1E+01	3.1E+01	1.1E+01	2.42E-02	1.E-03
Boiler #3	2.3E+00	1.57E+01	1.1E+01	3.5E+00	7.46E-03	4.E-04
Secondary Dryers	4.1E-03	3.E-04	5.9E-02	4.5E-02	0	3.E-07
Dryers - Stage A	5.9E-02	5.E-03	6.3E-01	6.5E-01	0	4.E-06
Dryer - Stage B	2.4E-02	2.E-03	2.5E-01	2.6E-01	0	2.E-06
Dryers - Stages C	2.4E-02	2.E-03	2.5E-01	2.6E-01	0	2.E-06
Space Heater - North	6.1E-02	5.E-03	8.03E-01	6.8E-01	0	4.E-06
Space Heater - South	6.1E-02	5.E-03	8.03E-01	6.8E-01	0	4.E-06
Space Heater - East	1.1E-01	9.E-03	1.50E+00	1.3E+00	0	8.E-06
Space Heater - Misc.	1.5E-02	1.E-03	2.09E-01	1.6E-01	0	1.E-06

TABLE 2. MAXIMUM EMISSION RATES
(grams per second)

Process	PM-10	SO2	NO2	CO	F	Pb
Fluidized Bed Dryer	9.6E-02	5.E-04	1.4E-01	7.2E-02	0	4.E-07
Boiler #4	9.42E-01	6.4E+00	3.9E+00	1.4E+00	3.05E-03	1.E-04
Boiler #3	2.9E-01	1.98E+00	1.4E+00	4.4E-01	9.40E-04	5.E-05
Secondary Dryers	5.2E-04	4.E-05	7.4E-03	5.7E-03	0	4.E-08
Dryers - Stage A	7.5E-03	6.E-04	8.0E-02	8.2E-02	0	5.E-07
Dryer - Stage B	3.0E-03	2.E-04	3.2E-02	3.3E-02	0	2.E-07
Dryers - Stages C	3.0E-03	2.E-04	3.2E-02	3.3E-02	0	2.E-07
Space Heater - North	7.7E-03	6.E-04	1.01E-01	8.5E-02	0	5.E-07
Space Heater - South	7.7E-03	6.E-04	1.01E-01	8.5E-02	0	5.E-07
Space Heater - East	1.4E-02	1.E-03	1.89E-01	1.6E-01	0	9.E-07
Space Heater - Misc.	1.9E-03	1.E-04	2.6E-02	2.1E-02	0	1.E-07

TABLE 3. MAXIMUM ANNUAL EMISSION RATES
(tons per year)

Process	PM-10	SO2	NO2	CO	F	Pb
Fluidized Bed Dryer	3.3E+00	2.E-02	4.8E+00	2.5E+00	0	1.E-05
Boiler #4	3.28E+01	2.2E+02	1.4E+02	4.8E+01	1.06E-01	4.E-03
Boiler #3	3.7E+00	2.5E+01	1.8E+01	5.6E+00	1.19E-02	6.E-04
Secondary Dryers	1.8E-02	1.E-03	2.6E-01	2.0E-01	0	1.E-06
Dryers - Stage A	2.6E-01	2.E-02	2.8E+00	2.9E+00	0	2.E-05
Dryer - Stage B	1.0E-01	8.E-03	1.1E+00	1.1E+00	0	7.E-06
Dryers - Stages C	1.0E-01	8.E-03	1.1E+00	1.1E+00	0	7.E-06
Space Heater - North	1.8E-01	1.5E-02	2.4E+00	2.0E+00	0.0E+00	1.2E-05
Space Heater - South	1.8E-01	1.5E-02	2.4E+00	2.0E+00	0.0E+00	1.2E-05
Space Heater - East	3.4E-01	2.7E-02	4.5E+00	3.8E+00	0.0E+00	2.3E-05
Space Heater - Misc.	4.5E-02	3.5E-03	6.3E-01	5.0E-01	0.0E+00	2.9E-06
TOTAL ANNUAL EMISSIONS	**4.10E+01**	**2.48E+02**	**1.73E+02**	**7.0E+01**	**1.18E-01**	**5.E-03**

Notes: Emissions from Boiler #3 based on 3,185 hours of operation per year.
Emissions from all space heaters based on 6,048 hours of operation for each unit per year.

TOXIC AIR POLLUTANT CALCULATIONS

TABLE 1. BOILER #4 - NON-CARCINOGENS
FUEL OIL

Pollutant	Emission Factor (lb/1,000 gal)	Emissions (lb/hr)	Emissions (tons/yr)	Emissions (grams/sec)
Antimony	5.25E-03	3.41E-03	1.49E-02	4.30E-04
Barium	2.57E-03	1.67E-03	7.32E-03	2.10E-04
Chromium	8.45E-04	5.49E-04	2.41E-03	6.92E-05
Cobalt	6.02E-03	3.91E-03	1.71E-02	4.93E-04
Copper	1.76E-03	1.14E-03	5.01E-03	1.44E-04
Ethylbenzene	6.36E-05	4.13E-05	1.81E-04	5.21E-06
Fluoride	3.73E-02	2.42E-02	1.06E-01	3.05E-03
Hexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Manganese	3.00E-03	1.95E-03	8.54E-03	2.46E-04
Mercury	4*	4.E-04	2.E-03	5.E-05
Moybdenum	7.87E-04	5.12E-04	2.24E-03	6.45E-05
Naphthalene	1.13E-03	7.35E-04	3.22E-03	9.25E-05
Pentane	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phosphorous	9.46E-03	6.15E-03	2.69E-02	7.75E-04
Selenium	15*	2.1E-03	9.2E-03	2.6E-04
Toluene	6.20E-03	4.03E-03	1.77E-02	5.08E-04
o-Xylene	1.09E-04	7.09E-05	3.10E-04	8.93E-06
Zinc	2.91E-02	1.89E-02	8.28E-02	2.38E-03

TABLE 2. BOILER #4 - CARCINOGENS
FUEL OIL

Pollutant	Emission Factor (lb/1,000 gal)	Emissions (lb/hr)	Emissions (tons/yr)	Emissions (grams/sec)
Arsenic	1.32E-03	8.58E-04	3.76E-03	1.08E-04
Benzene	2.14E-04	1.39E-04	6.09E-04	1.75E-05
Beryllium	4*	4.E-04	2.E-03	5.E-05
Cadmium	3.98E-04	2.59E-04	1.13E-03	3.26E-05
Chromium VI	2.48E-04	1.61E-04	7.06E-04	2.03E-05
Formaldehyde	3.30E-02	2.15E-02	9.40E-02	2.70E-03
Nickel	8.45E-02	5.49E-02	2.41E-01	6.92E-03
Benzo(a)pyrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benz(a)anthracene	4.01E-06	2.61E-06	1.14E-05	3.28E-07
Benzo(b)fluoranthene	7.40E-07	4.81E-07	2.11E-06	6.06E-08
Benzo(k)fluoranthene	7.40E-07	4.81E-07	2.11E-06	6.06E-08
Chrysene	2.38E-06	1.55E-06	6.78E-06	1.95E-07
Dibenzo(a,h)anthracene	1.67E-06	1.09E-06	4.75E-06	1.37E-07
Indeno(1,2,3-cd)pyrene	2.14E-06	1.39E-06	6.09E-06	1.75E-07
Total PAHs	1.17E-05	7.59E-06	3.33E-05	9.57E-07

Notes: * Emission factor units in pounds per 1,000,000 MMBTU.

Emission estimates represent maximum emissions based on burning #2, #4, #5, or #6 fuel oil, and based on AP-42 Tables 1.3-9, 1.3-10, and 1.3-11.

Emissions based on boiler operating with maximum fuel usage of 650 gal/hour.

Emissions based on 8,760 hours of operation.

TABLE 3. BOILER #4 - NON-CARCINOGENS
NATURAL GAS

Pollutant	Emission Factor (lb/1,000,000 scf)	Emissions (lb/hr)	Emissions (tons/yr)	Emissions (grams/sec)
Antimony	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Barium	4.4E-03	6.0E-04	2.6E-03	7.6E-05
Chromium	1.4E-03	1.9E-04	8.4E-04	2.4E-05
Cobalt	8.4E-05	1.1E-05	5.0E-05	1.4E-06
Copper	8.5E-04	1.2E-04	5.1E-04	1.5E-05
Ethylbenzene	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Fluoride	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Hexane	1.8E+00	2.5E-01	1.1E+00	3.1E-02
Manganese	3.8E-04	5.2E-05	2.3E-04	6.5E-06
Mercury	2.6E-04	3.5E-05	1.6E-04	4.5E-06
Molybdenum	1.1E-03	1.5E-04	6.6E-04	1.9E-05
Naphthalene	6.1E-04	8.3E-05	3.6E-04	1.0E-05
Pentane	2.6E+00	3.5E-01	1.6E+00	4.5E-02
Phosphorous	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Selenium	2.4E-05	3.3E-06	1.4E-05	4.1E-07
Toluene	3.4E-03	4.6E-04	2.0E-03	5.8E-05
o-Xylene	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Zinc	2.9E-02	4.0E-03	1.7E-02	5.0E-04

TABLE 4. BOILER #4 - CARCINOGENS
NATURAL GAS

Pollutant	Emission Factor (lb/1,000,000 scf)	Emissions (lb/hr)	Emissions (tons/yr)	Emissions (grams/sec)
Arsenic	2.0E-04	2.7E-05	1.2E-04	3.4E-06
Benzene	2.1E-03	2.9E-04	1.3E-03	3.6E-05
Beryllium	1.2E-05	1.6E-06	7.2E-06	2.1E-07
Cadmium	1.1E-03	1.5E-04	6.6E-04	1.9E-05
Chromium VI	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Formaldehyde	7.5E-02	1.0E-02	4.5E-02	1.3E-03
Nickel	2.1E-03	2.9E-04	1.3E-03	3.6E-05
Benzo(a)pyrene	1.2E-06	1.6E-07	7.2E-07	2.1E-08
Benz(a)anthracene	1.8E-06	2.5E-07	1.1E-06	3.1E-08
Benzo(b)fluoranthene	1.8E-06	2.5E-07	1.1E-06	3.1E-08
Benzo(k)fluoranthene	1.8E-06	2.5E-07	1.1E-06	3.1E-08
Chrysene	1.8E-06	2.5E-07	1.1E-06	3.1E-08
Dibenzo(a,h)anthracene	1.2E-06	1.6E-07	7.2E-07	2.1E-08
Indeno(1,2,3-cd)pyrene	1.8E-06	2.5E-07	1.1E-06	3.1E-08
Total PAHs	1.1E-05	1.6E-06	6.8E-06	2.0E-07

Notes: Emissions based on boiler operating at maximum rate of 140 MMBTU/hr.
Assumed 1,027 BTU/scf heat content of natural gas.
Emissions based on 8,760 hours of operation.

TOXIC AIR POLLUTANT CALCULATIONS

TABLE 1. BOILER #3 - NON-CARCINOGENS
FUEL OIL

Pollutant	Emission Factor (lb/1,000 gal)	Emissions (lb/hr)	Emissions (tons/yr)	Emissions (grams/sec)
Antimony	5.25E-03	1.05E-03	1.67E-03	1.32E-04
Barium	2.57E-03	5.14E-04	8.19E-04	6.48E-05
Chromium	8.45E-04	1.69E-04	2.69E-04	2.13E-05
Cobalt	6.02E-03	1.20E-03	1.92E-03	1.52E-04
Copper	1.76E-03	3.52E-04	5.61E-04	4.44E-05
Ethylbenzene	6.36E-05	1.27E-05	2.03E-05	1.60E-06
Fluoride	3.73E-02	7.46E-03	1.19E-02	9.40E-04
Hexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Manganese	3.00E-03	6.00E-04	9.56E-04	7.56E-05
Mercury	4*	2.E-04	3.E-04	2.E-05
Moybdenum	7.87E-04	1.57E-04	2.51E-04	1.98E-05
Naphthalene	1.13E-03	2.26E-04	3.60E-04	2.85E-05
Pentane	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phosphorous	9.46E-03	1.89E-03	3.01E-03	2.38E-04
Selenium	15*	1.7E-04	2.7E-04	2.2E-05
Toluene	6.20E-03	1.24E-03	1.97E-03	1.56E-04
o-Xylene	1.09E-04	2.18E-05	3.47E-05	2.75E-06
Zinc	2.91E-02	5.82E-03	9.27E-03	7.33E-04

TABLE 2. BOILER #3 - CARCINOGENS
FUEL OIL

Pollutant	Emission Factor (lb/1,000 gal)	Emissions (lb/hr)	Emissions (tons/yr)	Emissions (grams/sec)
Arsenic	1.32E-03	2.64E-04	4.20E-04	3.33E-05
Benzene	2.14E-04	4.28E-05	6.82E-05	5.39E-06
Beryllium	4*	2.E-04	3.E-04	2.E-05
Cadmium	3.98E-04	7.96E-05	1.27E-04	1.00E-05
Chromium VI	2.48E-04	4.96E-05	7.90E-05	6.25E-06
Formaldehyde	3.30E-02	6.60E-03	1.05E-02	8.32E-04
Nickel	8.45E-02	1.69E-02	2.69E-02	2.13E-03
Benzo(a)pyrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benz(a)anthracene	4.01E-06	8.02E-07	1.28E-06	1.01E-07
Benzo(b)fluoranthene	7.40E-07	1.48E-07	2.36E-07	1.86E-08
Benzo(k)fluoranthene	7.40E-07	1.48E-07	2.36E-07	1.86E-08
Chrysene	2.38E-06	4.76E-07	7.58E-07	6.00E-08
Dibenzo(a,h)anthracene	1.67E-06	3.34E-07	5.32E-07	4.21E-08
Indeno(1,2,3-cd)pyrene	2.14E-06	4.28E-07	6.82E-07	5.39E-08
Total PAHs	1.17E-05	2.34E-06	3.72E-06	2.94E-07

Notes: * Emission factor units in pounds per 1,000,000 MMBTU.

Emission estimates represent maximum emissions based on burning #2, #4, #5, or #6 fuel oil, and based on AP-42 Tables 1.3-9, 1.3-10, and 1.3-11.

Emissions based on boiler operating with maximum fuel usage of 200 gal/hour.

Emissions based on 3,185 hours of operation.

TABLE 3. BOILER #3 - NON-CARCINOGENS
NATURAL GAS

Pollutant	Emission Factor (lb/1,000,000 scf)	Emissions (lb/hr)	Emissions (tons/yr)	Emissions (grams/sec)
Antimony	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Barium	4.4E-03	1.8E-04	2.9E-04	2.3E-05
Chromium	1.4E-03	5.9E-05	9.3E-05	7.4E-06
Cobalt	8.4E-05	3.5E-06	5.6E-06	4.4E-07
Copper	8.5E-04	3.6E-05	5.7E-05	4.5E-06
Ethylbenzene	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Fluoride	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Hexane	1.8E+00	7.5E-02	1.2E-01	9.5E-03
Manganese	3.8E-04	1.6E-05	2.5E-05	2.0E-06
Mercury	2.6E-04	1.1E-05	1.7E-05	1.4E-06
Molybdenum	1.1E-03	4.6E-05	7.3E-05	5.8E-06
Naphthalene	6.1E-04	2.6E-05	4.1E-05	3.2E-06
Pentane	2.6E+00	1.1E-01	1.7E-01	1.4E-02
Phosphorous	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Selenium	2.4E-05	1.0E-06	1.6E-06	1.3E-07
Toluene	3.4E-03	1.4E-04	2.3E-04	1.8E-05
o-Xylene	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Zinc	2.9E-02	1.2E-03	1.9E-03	1.5E-04

TABLE 4. BOILER #3 - CARCINOGENS
NATURAL GAS

Pollutant	Emission Factor (lb/1,000,000 scf)	Emissions (lb/hr)	Emissions (tons/yr)	Emissions (grams/sec)
Arsenic	2.0E-04	8.4E-06	1.3E-05	1.1E-06
Benzene	2.1E-03	8.8E-05	1.4E-04	1.1E-05
Beryllium	1.2E-05	5.0E-07	8.0E-07	6.3E-08
Cadmium	1.1E-03	4.6E-05	7.3E-05	5.8E-06
Chromium VI	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Formaldehyde	7.5E-02	3.1E-03	5.0E-03	4.0E-04
Nickel	2.1E-03	8.8E-05	1.4E-04	1.1E-05
Benzo(a)pyrene	1.2E-06	5.0E-08	8.0E-08	6.3E-09
Benz(a)anthracene	1.8E-06	7.5E-08	1.2E-07	9.5E-09
Benzo(b)fluoranthene	1.8E-06	7.5E-08	1.2E-07	9.5E-09
Benzo(k)fluoranthene	1.8E-06	7.5E-08	1.2E-07	9.5E-09
Chrysene	1.8E-06	7.5E-08	1.2E-07	9.5E-09
Dibenzo(a,h)anthracene	1.2E-06	5.0E-08	8.0E-08	6.3E-09
Indeno(1,2,3-cd)pyrene	1.8E-06	7.5E-08	1.2E-07	9.5E-09
Total PAHs	1.1E-05	4.8E-07	7.6E-07	6.0E-08

Notes: Emissions based on boiler operating at maximum rate of 43.03 MMBTU/hr.
Assumed 1,027 BTU/scf heat content of natural gas.
Emissions based on 3,185 hours of operation.

TOXIC AIR POLLUTANTS CALCULATIONS

TABLE 1. FLUID BED DRYER - NON-CARCINOGENS
NATURAL GAS

Pollutant	Emission Factor (lb/1,000,000 scf)	Emissions (lb/hr)	Emissions (tons/yr)	Emissions (grams/sec)
Antimony	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Barium	4.4E-03	3.0E-05	1.3E-04	3.8E-06
Chromium	1.4E-03	9.5E-06	4.2E-05	1.2E-06
Cobalt	8.4E-05	5.7E-07	2.5E-06	7.2E-08
Copper	8.5E-04	5.8E-06	2.5E-05	7.3E-07
Ethylbenzene	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Fluoride	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Hexane	1.8E+00	1.2E-02	5.4E-02	1.5E-03
Manganese	3.8E-04	2.6E-06	1.1E-05	3.3E-07
Mercury	2.6E-04	1.8E-06	7.8E-06	2.2E-07
Molybdenum	1.1E-03	7.5E-06	3.3E-05	9.4E-07
Naphthalene	6.1E-04	4.2E-06	1.8E-05	5.2E-07
Pentane	2.6E+00	1.8E-02	7.8E-02	2.2E-03
Phosphorous	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Selenium	2.4E-05	1.6E-07	7.2E-07	2.1E-08
Toluene	3.4E-03	2.3E-05	1.0E-04	2.9E-06
o-Xylene	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Zinc	2.9E-02	2.0E-04	8.7E-04	2.5E-05

TABLE 2. FLUID BED DRYER - CARCINOGENS
NATURAL GAS

Pollutant	Emission Factor (lb/1,000,000 scf)	Emissions (lb/hr)	Emissions (tons/yr)	Emissions (grams/sec)
Arsenic	2.00E-04	1.4E-06	6.0E-06	1.7E-07
Benzene	2.1E-03	1.4E-05	6.3E-05	1.8E-06
Beryllium	1.20E-05	8.2E-08	3.6E-07	1.0E-08
Cadmium	1.10E-03	7.5E-06	3.3E-05	9.4E-07
Chromium VI	0.00E+00	0.0E+00	0.0E+00	0.0E+00
Formaldehyde	7.5E-02	5.1E-04	2.2E-03	6.4E-05
Nickel	2.1E-03	1.4E-05	6.3E-05	1.8E-06
Benzo(a)pyrene	1.2E-06	8.2E-09	3.6E-08	1.0E-09
Benz(a)anthracene	1.8E-06	1.2E-08	5.4E-08	1.5E-09
Benzo(b)fluoranthene	1.8E-06	1.2E-08	5.4E-08	1.5E-09
Benzo(k)fluoranthene	1.8E-06	1.2E-08	5.4E-08	1.5E-09
Chrysene	1.8E-06	1.2E-08	5.4E-08	1.5E-09
Dibenzo(a,h)anthracene	1.2E-06	8.2E-09	3.6E-08	1.0E-09
Indeno(1,2,3-cd)pyrene	1.8E-06	1.2E-08	5.4E-08	1.5E-09
Total PAHs	1.1E-05	7.8E-08	3.4E-07	9.8E-09

Notes: Emissions based on two Maxon burners operating at maximum rate of 3.5 MMBTU/hr.
Assumed 1,027 BTU/scf heat content of natural gas.
Emissions based on 8,760 hours of operation.

TOXIC AIR POLLUTANT CALCULATIONS

TABLE 1. DRYERS A, B, & C - NON-CARCINOGENS
NATURAL GAS

Pollutant	Emission Factor (lb/1,000,000 scf)	Emissions Dryer A (lb/hr)	Emissions Dryer B (lb/hr)	Emissions Dryer C (lb/hr)	Dryer A Emissions (grams/sec)	Dryer B Emissions (grams/sec)	Dryer C Emissions (grams/sec)
Antimony	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Barium	4.4E-03	3.4E-05	1.4E-05	1.4E-05	4.3E-06	1.7E-06	1.7E-06
Chromium	1.4E-03	1.1E-05	4.4E-06	4.4E-06	1.4E-06	5.5E-07	5.5E-07
Cobalt	8.4E-05	6.5E-07	2.6E-07	2.6E-07	8.2E-08	3.3E-08	3.3E-08
Copper	8.5E-04	6.6E-06	2.6E-06	2.6E-06	8.3E-07	3.3E-07	3.3E-07
Ethylbenzene	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Fluoride	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Hexane	1.8E+00	1.4E-02	5.6E-03	5.6E-03	1.8E-03	7.1E-04	7.1E-04
Manganese	3.8E-04	3.0E-06	1.2E-06	1.2E-06	3.7E-07	1.5E-07	1.5E-07
Mercury	2.6E-04	2.0E-06	8.1E-07	8.1E-07	2.6E-07	1.0E-07	1.0E-07
Molybdenum	1.1E-03	8.6E-06	3.4E-06	3.4E-06	1.1E-06	4.3E-07	4.3E-07
Naphthalene	6.1E-04	4.8E-06	1.9E-06	1.9E-06	6.0E-07	2.4E-07	2.4E-07
Pentane	2.6E+00	2.0E-02	8.1E-03	8.1E-03	2.6E-03	1.0E-03	1.0E-03
Phosphorous	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Selenium	2.4E-05	1.9E-07	7.5E-08	7.5E-08	2.4E-08	9.4E-09	9.4E-09
Toluene	3.4E-03	2.6E-05	1.1E-05	1.1E-05	3.3E-06	1.3E-06	1.3E-06
o-Xylene	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Zinc	2.9E-02	2.3E-04	9.0E-05	9.0E-05	2.8E-05	1.1E-05	1.1E-05

TABLE 2. DRYERS A, B, & C - CARCINOGENS
NATURAL GAS

Pollutant	Emission Factor (lb/1,000,000 scf)	Emissions Dryer A (lb/hr)	Emissions Dryer B (lb/hr)	Emissions Dryer C (lb/hr)	Dryer A Emissions (grams/sec)	Dryer B Emissions (grams/sec)	Dryer C Emissions (grams/sec)
Arsenic	2.0E-04	1.6E-06	6.2E-07	6.2E-07	2.0E-07	7.9E-08	7.9E-08
Benzene	2.1E-03	1.6E-05	6.5E-06	6.5E-06	2.1E-06	8.2E-07	8.2E-07
Beryllium	1.2E-05	9.3E-08	3.7E-08	3.7E-08	1.2E-08	4.7E-09	4.7E-09
Cadmium	1.1E-03	8.6E-06	3.4E-06	3.4E-06	1.1E-06	4.3E-07	4.3E-07
Chromium VI	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Formaldehyde	7.5E-02	5.8E-04	2.3E-04	2.3E-04	7.4E-05	2.9E-05	2.9E-05
Nickel	2.1E-03	1.6E-05	6.5E-06	6.5E-06	2.1E-06	8.2E-07	8.2E-07
Benzo(a)pyrene	1.2E-06	9.3E-09	3.7E-09	3.7E-09	1.2E-09	4.7E-10	4.7E-10
Benz(a)anthracene	1.8E-06	1.4E-08	5.6E-09	5.6E-09	1.8E-09	7.1E-10	7.1E-10
Benzo(b)fluoranthene	1.8E-06	1.4E-08	5.6E-09	5.6E-09	1.8E-09	7.1E-10	7.1E-10
Benzo(k)fluoranthene	1.8E-06	1.4E-08	5.6E-09	5.6E-09	1.8E-09	7.1E-10	7.1E-10
Chrysene	1.8E-06	1.4E-08	5.6E-09	5.6E-09	1.8E-09	7.1E-10	7.1E-10
Dibenzo(a,h)anthracene	1.2E-06	9.3E-09	3.7E-09	3.7E-09	1.2E-09	4.7E-10	4.7E-10
Indeno(1,2,3-cd)pyrene	1.8E-06	1.4E-08	5.6E-09	5.6E-09	1.8E-09	7.1E-10	7.1E-10
Total PAHs	1.1E-05	8.9E-08	3.6E-08	3.6E-08	1.1E-08	4.5E-09	4.5E-09

Notes: Emissions based on Dryer A operating at 8 MMBTU/hr, Dryer B operating at 3.2 MMBTU/hr, and Dryer C operating at 3.2 MMBTU/hr.

Assumed 1,027 BTU/scf heat content of natural gas.

Emissions based on 8,760 hours of operation for each dryer.

TOXIC AIR POLLUTANT CALCULATIONS

TABLE 1. SECONDARY DRYER - NON-CARCINOGENS
NATURAL GAS

Pollutant	Emission Factor (lb/1,000,000 scf)	Emissions (lb/hr)	Emissions (tons/yr)	Emissions (grams/sec)
Antimony	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Barium	4.4E-03	2.4E-06	1.0E-05	3.0E-07
Chromium	1.4E-03	7.5E-07	3.3E-06	9.4E-08
Cobalt	8.4E-05	4.5E-08	2.0E-07	5.7E-09
Copper	8.5E-04	4.6E-07	2.0E-06	5.7E-08
Ethylbenzene	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Fluoride	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Hexane	1.8E+00	9.6E-04	4.2E-03	1.2E-04
Manganese	3.8E-04	2.0E-07	8.9E-07	2.6E-08
Mercury	2.6E-04	1.4E-07	6.1E-07	1.8E-08
Molybdenum	1.1E-03	5.9E-07	2.6E-06	7.4E-08
Naphthalene	6.1E-04	3.3E-07	1.4E-06	4.1E-08
Pentane	2.6E+00	1.4E-03	6.1E-03	1.8E-04
Phosphorous	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Selenium	2.4E-05	1.3E-08	5.6E-08	1.6E-09
Toluene	3.4E-03	1.8E-06	8.0E-06	2.3E-07
o-Xylene	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Zinc	2.9E-02	1.6E-05	6.8E-05	2.0E-06

TABLE 2. SECONDARY DRYER - CARCINOGENS
NATURAL GAS

Pollutant	Emission Factor (lb/1,000,000 scf)	Emissions (lb/hr)	Emissions (tons/yr)	Emissions (grams/sec)
Arsenic	2.0E-04	1.1E-07	4.7E-07	1.3E-08
Benzene	2.1E-03	1.1E-06	4.9E-06	1.4E-07
Beryllium	1.2E-05	6.4E-09	2.8E-08	8.1E-10
Cadmium	1.1E-03	5.9E-07	2.6E-06	7.4E-08
Chromium VI	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Formaldehyde	7.5E-02	4.0E-05	1.8E-04	5.1E-06
Nickel	2.1E-03	1.1E-06	4.9E-06	1.4E-07
Benzo(a)pyrene	1.2E-06	6.4E-10	2.8E-09	8.1E-11
Benz(a)anthracene	1.8E-06	9.6E-10	4.2E-09	1.2E-10
Benzo(b)fluoranthene	1.8E-06	9.6E-10	4.2E-09	1.2E-10
Benzo(k)fluoranthene	1.8E-06	9.6E-10	4.2E-09	1.2E-10
Chrysene	1.8E-06	9.6E-10	4.2E-09	1.2E-10
Dibenzo(a,h)anthracene	1.2E-06	6.4E-10	2.8E-09	8.1E-11
Indeno(1,2,3-cd)pyrene	1.8E-06	9.6E-10	4.2E-09	1.2E-10
Total PAHs	1.1E-05	6.1E-09	2.7E-08	7.7E-10

Notes: Emissions based on dryer operating at a maximum rate of 0.55 MMBTU/hr.
Assumed 1,027 BTU/scf heat content of natural gas.
Emissions based on 8,760 hours.

TOXIC AIR POLLUTANT CALCULATIONS

TABLE 1. SPACE HEATERS N, E, & S - NON-CARCINOGENS
NATURAL GAS

Pollutant	Emission Factor (lb/1,000,000 scf)	Emissions SH South (lb/hr)	Emissions SH North (lb/hr)	Emissions SH East (lb/hr)	Emissions SH South (grams/sec)	Emissions SH North (grams/sec)	Emissions SH East (grams/sec)
Antimony	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Barium	4.4E-03	3.5E-05	3.5E-05	6.8E-05	4.5E-06	4.5E-06	8.3E-06
Chromium	1.4E-03	1.1E-05	1.1E-05	2.1E-05	1.4E-06	1.4E-06	2.6E-06
Cobalt	8.4E-05	6.7E-07	6.7E-07	1.3E-06	8.5E-08	8.5E-08	1.6E-07
Copper	8.5E-04	6.8E-06	6.8E-06	1.3E-05	8.6E-07	8.6E-07	1.6E-06
Ethylbenzene	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Fluoride	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Hexane	1.8E+00	1.4E-02	1.4E-02	2.7E-02	1.8E-03	1.8E-03	3.4E-03
Manganese	3.8E-04	3.1E-06	3.1E-06	5.7E-06	3.8E-07	3.8E-07	7.2E-07
Mercury	2.6E-04	2.1E-06	2.1E-06	3.9E-06	2.6E-07	2.6E-07	4.9E-07
Molybdenum	1.1E-03	8.8E-06	8.8E-06	1.6E-05	1.1E-06	1.1E-06	2.1E-06
Naphthalene	6.1E-04	4.9E-06	4.9E-06	9.1E-06	6.2E-07	6.2E-07	1.2E-06
Pentane	2.6E+00	2.1E-02	2.1E-02	3.9E-02	2.6E-03	2.6E-03	4.9E-03
Phosphorous	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Selenium	2.4E-05	1.9E-07	1.9E-07	3.6E-07	2.4E-08	2.4E-08	4.5E-08
Toluene	3.4E-03	2.7E-05	2.7E-05	5.1E-05	3.4E-06	3.4E-06	6.4E-06
o-Xylene	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Zinc	2.9E-02	2.3E-04	2.3E-04	4.3E-04	2.9E-05	2.9E-05	5.5E-05

TABLE 2. SPACE HEATERS N, E, & S - CARCINOGENS
NATURAL GAS

Pollutant	Emission Factor (lb/1,000,000 scf)	Emissions SH South (lb/hr)	Emissions SH North (lb/hr)	Emissions SH East (lb/hr)	Emissions SH South (grams/sec)	Emissions SH North (grams/sec)	Emissions SH East (grams/sec)
Arsenic	2.0E-04	1.6E-06	1.6E-06	3.0E-06	2.0E-07	2.0E-07	3.8E-07
Benzene	2.1E-03	1.7E-05	1.7E-05	3.1E-05	2.1E-06	2.1E-06	4.0E-06
Beryllium	1.2E-05	9.6E-08	9.6E-08	1.8E-07	1.2E-08	1.2E-08	2.3E-08
Cadmium	1.1E-03	8.8E-06	8.8E-06	1.6E-05	1.1E-06	1.1E-06	2.1E-06
Chromium VI	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Formaldehyde	7.5E-02	6.0E-04	6.0E-04	1.1E-03	7.6E-05	7.6E-05	1.4E-04
Nickel	2.1E-03	1.7E-05	1.7E-05	3.1E-05	2.1E-06	2.1E-06	4.0E-06
Benzo(a)pyrene	1.2E-06	9.6E-09	9.6E-09	1.8E-08	1.2E-09	1.2E-09	2.3E-09
Benz(a)anthracene	1.8E-06	1.4E-08	1.4E-08	2.7E-08	1.8E-09	1.8E-09	3.4E-09
Benzo(b)fluoranthene	1.8E-06	1.4E-08	1.4E-08	2.7E-08	1.8E-09	1.8E-09	3.4E-09
Benzo(k)fluoranthene	1.8E-06	1.4E-08	1.4E-08	2.7E-08	1.8E-09	1.8E-09	3.4E-09
Chrysene	1.8E-06	1.4E-08	1.4E-08	2.7E-08	1.8E-09	1.8E-09	3.4E-09
Dibenzo(a,h)anthracene	1.2E-06	9.6E-09	9.6E-09	1.8E-08	1.2E-09	1.2E-09	2.3E-09
Indeno(1,2,3-cd)pyrene	1.8E-06	1.4E-08	1.4E-08	2.7E-08	1.8E-09	1.8E-09	3.4E-09
Total PAHs	1.1E-05	9.2E-08	9.2E-08	1.7E-07	1.2E-08	1.2E-08	2.2E-08

Notes: Emissions based on north and south space heaters operating at 8.25 MMBTU/hr, and east space heater operating at 15.4 MMBTu/hr.

Assumed 1,027 BTU/scf heat content of natural gas.

Emissions based on 6,048 hours of operation for each space heater.

TOXIC AIR POLLUTANT CALCULATIONS

TABLE 1. MISC. SPACE HEATERS - NON-CARCINOGENS
NATURAL GAS

Pollutant	Emission Factor (lb/1,000,000 scf)	Emissions (lb/hr)	Emissions (tons/yr)	Emissions (grams/sec)
Antimony	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Barium	4.4E-03	8.6E-06	2.6E-05	1.1E-06
Chromium	1.4E-03	2.7E-06	8.2E-06	3.4E-07
Cobalt	8.4E-05	1.6E-07	4.9E-07	2.1E-08
Copper	8.5E-04	1.7E-06	5.0E-06	2.1E-07
Ethylbenzene	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Fluoride	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Hexane	1.8E+00	3.5E-03	1.1E-02	4.4E-04
Manganese	3.8E-04	7.4E-07	2.2E-06	9.3E-08
Mercury	2.6E-04	5.1E-07	1.5E-06	6.4E-08
Molybdenum	1.1E-03	2.1E-06	6.5E-06	2.7E-07
Naphthalene	6.1E-04	1.2E-06	3.6E-06	1.5E-07
Pentane	2.6E+00	5.1E-03	1.5E-02	6.4E-04
Phosphorous	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Selenium	2.4E-05	4.7E-08	1.4E-07	5.9E-09
Toluene	3.4E-03	6.6E-06	2.0E-05	8.3E-07
o-Xylene	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Zinc	2.9E-02	5.6E-05	1.7E-04	7.1E-06

TABLE 2. MISC. SPACE HEATERS - CARCINOGENS
NATURAL GAS

Pollutant	Emission Factor (lb/1,000,000 scf)	Emissions (lb/hr)	Emissions (tons/yr)	Emissions (grams/sec)
Arsenic	2.0E-04	3.9E-07	1.2E-06	4.9E-08
Benzene	2.1E-03	4.1E-06	1.2E-05	5.2E-07
Beryllium	1.2E-05	2.3E-08	7.1E-08	2.9E-09
Cadmium	1.1E-03	2.1E-06	6.5E-06	2.7E-07
Chromium VI	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Formaldehyde	7.5E-02	1.5E-04	4.4E-04	1.8E-05
Nickel	2.1E-03	4.1E-06	1.2E-05	5.2E-07
Benzo(a)pyrene	1.2E-06	2.3E-09	7.1E-09	2.9E-10
Benz(a)anthracene	1.8E-06	3.5E-09	1.1E-08	4.4E-10
Benzo(b)fluoranthene	1.8E-06	3.5E-09	1.1E-08	4.4E-10
Benzo(k)fluoranthene	1.8E-06	3.5E-09	1.1E-08	4.4E-10
Chrysene	1.8E-06	3.5E-09	1.1E-08	4.4E-10
Dibenzo(a,h)anthracene	1.2E-06	2.3E-09	7.1E-09	2.9E-10
Indeno(1,2,3-cd)pyrene	1.8E-06	3.5E-09	1.1E-08	4.4E-10
Total PAHs	1.1E-05	2.2E-08	6.7E-08	2.8E-09

Notes: Emissions based on heaters operating at an aggregate maximum rate of 2 MMBTU/hr.
Assumed 1,027 BTU/scf heat content of natural gas.
Emissions based on 6,048 hours of operation for each space heater.

SUMMARY OF TOXIC AIR POLLUTANT EMISSIONS

TABLE 1. NON-CARCINOGENS

Pollutant	Max. Hourly Emissions (lb/hr)	Screening Level (lb/hr)	Modeling? (Y/N)	Emissions (tons/yr)
Antimony	4.5E-03	3.3E-02	N	1.3E-02
Barium	2.4E-03	3.3E-02	N	7.3E-03
Chromium	7.9E-04	3.3E-02	N	2.4E-03
Cobalt	5.1E-03	3.3E-03	Y	1.5E-02
Copper	1.5E-03	6.7E-02	N	4.7E-03
Ethylbenzene	5.4E-05	2.9E+01	N	1.6E-04
Fluoride	3.17E-02	1.67E-01	N	9.6E-02
Hexane	9.8E-02	1.2E+01	N	3.0E-01
Manganese	2.57E-03	3.33E-01	N	7.8E-03
Mercury	6.E-04	3.E-03	N	1.8E-03
Molybdenum	7.29E-04	6.67E-01	N	2.2E-03
Naphthalene	9.94E-04	3.33E+00	N	3.0E-03
Pentane	1.41E-01	1.18E+02	N	4.3E-01
Phosphorous	8.E-03	7.E-03	Y	2.4E-02
Selenium	2.3E-03	1.3E-02	N	6.9E-03
Toluene	5.5E-03	2.5E+01	N	1.6E-02
o-Xylene	9.3E-05	2.9E+01	N	2.8E-04
Zinc	2.63E-02	6.67E-01	N	8.0E-02

TABLE 2. CARCINOGENS

Pollutant	Max. Hourly Emissions (lb/hr)	Screening Level (lb/hr)	Modeling? (Y/N)	Emissions (tons/yr)
Arsenic	1.1E-03	1.5E-06	Y	3.4E-03
Benzene	3.0E-04	8.0E-04	N	9.0E-04
Beryllium	5.7E-04	2.8E-05	Y	1.7E-03
Cadmium	4.0E-04	3.7E-06	Y	1.2E-03
Chromium VI	2.1E-04	5.6E-07	Y	6.4E-04
Formaldehyde	3.2E-02	5.1E-04	Y	9.7E-02
Nickel	7.2E-02	2.7E-05	Y	2.2E-01
Benzo(a)pyrene	6.5E-08	2.0E-06	N	2.0E-07
Benz(a)anthracene	3.5E-06	NA	NA	1.1E-05
Benzo(b)fluoranthene	7.3E-07	NA	NA	2.2E-06
Benzo(k)fluoranthene	7.3E-07	NA	NA	2.2E-06
Chrysene	2.1E-06	NA	NA	6.4E-06
Dibenzo(a,h)anthracene	1.5E-06	NA	NA	4.5E-06
Indeno(1,2,3-cd)pyrene	1.9E-06	NA	NA	5.8E-06
Total PAHs	1.1E-05	2.0E-06	Y	3.2E-05

APPENDIX D

IDAHO SUPREME POTATOES, INC.

FIRTH FACILITY

TANKS 4.0 OUTPUT

TANKS 4.0
Emissions Report - Summary Format
Tank Identification and Physical Characteristics

Identification

User Identification:	Idaho Supreme 10000 gal diesel
City:	Firth
State:	Idaho
Company:	Idaho Supreme
Type of Tank:	Horizontal Tank
Description:	

Tank Dimensions

Shell Length (ft):	27.40
Diameter (ft):	8.00
Volume (gallons):	10,000.00
Turnovers:	0.00
Net Throughput (gal/yr):	10,000.00
Is Tank Heated (y/n):	N
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition:	Good

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig):	0.03

Meteorological Data used in Emissions Calculations: Pocatello, Idaho (Avg Atmospheric Pressure = 12.53 psia)

TANKS 4.0
Emissions Report - Summary Format
Individual Tank Emission Totals

Annual Emissions Report

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	0.13	1.49	1.62

TANKS 4.0
Emissions Report - Summary Format
Liquid Contents of Storage Tank

Mixture/Component	Month	Daily Liquid Surf. Temperatures (deg F) Avg.	Min.	Max.	Liquid Bulk Temp. (deg F)	Vapor Pressures (psia) Avg.	Min.	Max.	Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Distillate fuel oil no. 2	All	46.21	41.93	54.49	46.37	0.0044	0.0035	0.0054	130.0000			188.00	Option 5: A=12.101, B=8907

TANKS 4.0
Emissions Report - Summary Format
Tank Identification and Physical Characteristics

Identification

User Identification:	Idaho Supreme 20,000 gal Tank
City:	Firth
State:	Idaho
Company:	Idaho Supreme
Type of Tank:	Vertical Fixed Roof Tank
Description:	

Tank Dimensions

Shell Height (ft):	31.20
Diameter (ft):	10.50
Liquid Height (ft):	30.00
Avg. Liquid Height (ft):	20.00
Volume (gallons):	20,000.00
Turnovers:	3.50
Net Throughput (gal/yr):	70,000.00
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition:	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Roof Characteristics

Type:	Dome
Height (ft):	0.00
Radius (ft) (Dome Roof):	0.00

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig):	0.03

Meteorological Data used in Emissions Calculations: Pocatello, Idaho (Avg Atmospheric Pressure = 12.53 psia)

TANKS 4.0
Emissions Report - Summary Format
Individual Tank Emission Totals

Annual Emissions Report

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	0.94	1.75	2.69

TANKS 4.0
Emissions Report - Summary Format
Liquid Contents of Storage Tank

Mixture/Component	Month	Daily Liquid Surf. Temperatures (deg F) Avg.	Min.	Max.	Liquid Bulk Temp. (deg F)	Vapor Pressures (psia) Avg.	Min.	Max.	Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Distillate fuel oil no. 2	All	48.21	41.93	54.49	48.37	0.0044	0.0035	0.0054	130.0000			188.00	Option 5: A=12.101, B=8907

APPENDIX E

IDAHO SUPREME POTATOES, INC.

FIRTH FACILITY

MODELING MEMORANDUM

MEMORANDUM

TO: Michael Stambulis, State Office of Technical Services

FROM: Yayi Dong, State Office of Technical Services

SUBJECT: Modeling Review for the Tier II Operating Permit Application, Idaho Supreme Potatoes, Inc., Firth, Idaho

DATE: January 19, 2002

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1. SUMMARY:

JBR Environmental Consultants Inc., on behalf of Idaho Supreme Potatoes, Inc. (ISUP), submitted a Tier II operating permit (Tier II) application for its facility in Firth, Idaho. The Tier II application addresses all pollutants on a facility-wide basis. The criteria pollutants of concern for this facility are particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers (PM_{10}), oxides of nitrogen (NO_x), sulfur dioxide (SO_2), carbon monoxide (CO), and lead (Pb). It is also required to analyze the impact of toxic air pollutants (TAPs). There are no ambient air quality standards for TAPs for use in Tier II permitting actions. Procedures required to demonstrate compliance with IDAPA 58.01.01.161 have not been finalized. However, under IDAPA 58.01.01.161, the Department of Environmental Quality (DEQ) will ensure that any TAP "shall not be emitted in such quantities or concentrations as to alone, or in combination with other contaminants, injure or unreasonably affect human or animal life or vegetation." The Tier II permitting process requires those emissions, on a facility-wide basis, that exceed the screening emissions level presented in IDAPA 58.01.01.585 and 586 be modeled. The analysis demonstrated compliance with all regulatory requirements and the quantities of TAPs emissions were determined to not unreasonably affect human or animal life or vegetation.

2. DISCUSSION:

2.1 Process Description

Idaho Supreme Potatoes, Inc. Firth facility is located at the corner of Highway 91 and 800 North, Goshen Highway, less than one mile northeast of Firth. Air Quality Control Region 61 surrounding Firth (Bingham County) is attainment for all criteria pollutants. The Universal Transverse Mercator (UTM) coordinates of this facility are UTM North 4,795,900 meters and UTM East 404,800 meters, in Zone 12.

The main criteria pollutants released from this facility are PM_{10}, NO_x and SO_2. Other criteria pollutants emitted from this facility are CO and volatile organic compounds (VOCs). All pollutants are emitted from either the processing of potatoes or the combustion of fuel from boilers, dryers, or space heaters. Emission factors for PM_{10}, NO_x, SO_2, CO, and Pb are based on EPA's Compilation of Air Pollution Factors, 5th Edition, Version 7, November 1999. Ambient impacts of VOCs were not modeled in this evaluation because there are no ambient air quality standards for VOCs. See Table 1 for pollutant emission rates used in this evaluation.

Table 1. Emissions Rates of Criteria Pollutants

Source	PM_{10} [1] (g/s)[2]	SO_2 [3] (g/s)	CO[4] (g/s)	NO_x [5](g/s)	Lead (g/s)
Fluidized Bed Dryer	0.09	0.001	0.07	0.14	
No. 4 Bigelow Boiler	0.94	6.43	1.43	3.85	1.24E-04
No. 3 Cleaver Brooks	0.29	1.98	0.45	1.4	3.81E-05
Secondary Dryer (1st vent)	0.0003	0.0000	0.0028	0.0037	
Secondary Dryer (2nd vent)	0.0003	0.0000	0.0028	0.0037	
Secondary Dryer (1st vent)	4.71E-02				
Secondary Dryer (2nd vent)	4.71E-02				
Silo Storage A	8.06E-03				
Silo Storage B	8.06E-03				
Silo Storage C	8.06E-03				
Silo Storage D	8.06E-03				
Silo Storage E	8.06E-03				
Silo Storage F	8.06E-03				
Silo Storage G	8.06E-03				
Silo Storage H	8.06E-03				
Silo Storage I	8.06E-03				
Silo Storage J	8.06E-03				
Flaker No. 4	4.71E-02				
Flaker No. 3	4.71E-02				
Flaker No. 2	4.71E-02				
Flaker No. 1	4.71E-02				
Flaker No. 8	4.71E-02				
Flaker No. 7	4.71E-02				
Flaker No. 6	4.71E-02				
Flaker No. 5	4.71E-02				
Flaker No. 10	4.71E-02				
Flaker No. 9	4.71E-02				
Flaker No. 12	4.71E-02				
Flaker No. 11	4.71E-02				
Dryer Stage A	4.71E-02				
Dryer Stage B	4.71E-02				
Dryer Stage C	4.71E-02				
Dryer Stage A	0.007	0.001	0.061	0.097	
Dryer Stage B	0.003	0.000	0.033	0.039	
Dryer Stage C	0.003	0.000	0.033	0.039	
Space Heater South	7.69E-03	6.07E-04	8.50E-02	1.01E-01	
Space Heater North	7.69E-03	6.07E-04	8.50E-02	1.01E-01	
Space Heater East	1.44E-02	1.13E-03	1.59E-01	1.89E-01	

1. Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers
2. Grams per second
3. Sulfur dioxide
4. Carbon monoxide
5. Nitrogen dioxides

DEQ also requires TAPs to be evaluated. For non-carcinogenic TAPs, compliance under IDAPA 58.01.01.161 is demonstrated by meeting the limits in IDAPA 58.01.01.585, acceptable ambient concentrations (AAC). For carcinogenic TAPs, the cumulative risk calculated using the Unit Risk Factor (URF, IDAPA 58.01.01. 586) and modeled concentrations must be less than 1.0E-05. JBR has identified arsenic, cadmium, hexavalent chromium (Cr+6), formaldehyde (HCOH), nickel, beryllium, and polyaromatic hydrocarbons (PAHs) as the carcinogenic toxics that exceed the screening emissions level (EL). Cobalt, fluoride, and phosphorus are identified as carcinogenic toxics that exceed the EL. The emission rates are listed in Table 2.

Table 2. Emission Rates of TAPs

Source	Arsenic (g/s)[1]	Cadmium (g/s)	HCOH [2] (g/s)	Nickel (g/s)	Chromium +6[3] (g/s)	PAH (g/s)	Beryllium (g/s)	Cobalt (g/s)	Fluoride (g/s)	Phosphorous (g/s)
Fluidized Bed Dryer	1.72E-07	9.45E-07	6.44E-05	1.80E-06	0.00E+00	9.79E-09	1.03E-08	7.21E-08		
No. 4 Bigelow Boiler	9.17E-05	3.30E-08	2.30E-03	5.88E-03	2.03E-05	9.57E-07	3.46E-05	4.93E-04	2.67E-03	7.75E-04
No. 3 Cleaver Brooks	2.82E-05	1.02E-08	7.08E-04	1.81E-03	6.26E-06	2.94E-07	1.07E-05	1.52E-04	8.49E-04	2.38E-04
Secondary Dryer (1st vent)	7.12E-09	3.92E-08	2.67E-06	7.47E-08	0.00E+00	4.06E-10	4.27E-10	2.99E-09		
Secondary Dryer (2nd vent)	7.12E-09	3.92E-08	2.67E-06	7.47E-08	0.00E+00	4.06E-10	4.27E-10	2.99E-09		
Dryer Stage A	2.07E-07	1.14E-06	7.76E-05	2.17E-06	0.00E+00	1.18E-08	1.24E-08	8.70E-08		
Dryer Stage B	8.28E-08	4.55E-07	3.11E-05	8.69E-07	0.00E+00	4.72E-09	4.97E-09	3.48E-08		
Dryer Stage C	8.28E-08	4.55E-07	3.11E-05	8.69E-07	0.00E+00	4.72E-09	4.97E-09	3.48E-08		
Space Heater South	2.14E-07	1.17E-06	8.01E-05	2.24E-06	0.00E+00	1.22E-08	1.28E-08	8.97E-08		
Space Heater North	2.14E-07	1.17E-06	8.01E-05	2.24E-06	0.00E+00	1.22E-08	1.28E-08	8.97E-08		
Space Heater East	3.99E-07	2.19E-06	1.49E-04	4.18E-06	0.00E+00	2.27E-08	2.39E-08	1.68E-07		
Misc. Space Heaters	2.14E-07	1.17E-06	8.01E-05	2.24E-06	0.00E+00	1.22E-08	1.28E-08	8.97E-08		

1. Grams per second
2. Formaldehyde
3. It is conservative to assume that all chromium emissions were of the form chromium (+6), the most toxic form of chromium.

2.2 Applicable Air Quality Impact Limits

The facility is located in Firth, Idaho, which is attainment for all criteria pollutants. If the increment(s) of any criteria pollutant (CO, SO_2, PM_{10}, NO_2, and Pb) is higher than the significant contributions, the appropriate background concentration is added to those ambient concentration increments to determine compliance to the National Ambient Air Quality Standards (NAAQS). The NAAQS are listed in Table 3. The impact of carcinogenic TAPs is evaluated by calculating the cumulative risk of TAPs according to the DEQ modeling guidance (to be published). According to the DEQ's modeling guidance, the cumulative risk cannot exceed 1.0E-05.

Table 3. Applicable regulatory limits[1]

Pollutant	Averaging Period	Regulatory Limit ($\mu g/m^3$)[2]
NO_2[3]	Annual	100
SO_2[4]	3-hour	1,300
	24-hour	375
	Annual	80
CO[5]	1-hour	40,000 (NA)[7]
	8-hour	10,000 (NA)[7]
PM_{10}[6]	24-hour	150
	Annual	50

1. IDAPA 58.01.01.577
2. Micrograms per cubic meter
3. Nitrogen dioxide
4. Sulfur dioxide
5. Carbon monoxide
6. Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers
7. Since Ada County is a non-attainment area for CO (any time averaging period), the NAAQS are not applicable.

2.3 Background Concentrations

Table 4 is the background for regulated air pollutants. There are no background concentrations available for TAPs.

Table 4. Background concentrations

Pollutant	Averaging Period	Background Concentration ($\mu g/m^3$)[1]
NO_2[2]	Annual	40
SO_2[3]	3-hour	18.3
	24-hour	120
	Annual	374
CO[4]	1-hour	11,450
	8-hour	5,130
PM_{10}[5]	24-hour	86
	Annual	32.7

1. Micrograms per cubic meter
2. Nitrogen dioxide
3. Sulfur dioxide
4. Carbon monoxide
5. Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers

2.4 Modeling Impact Assessment

ISC-3 was used for this analysis. Surface meteorological data of 1987 through 1991 from Pocatello Airport (Station 24156) were used. The upper air data used are from station 24127 (Idaho Falls, Idaho). Environmental Protection Agency (EPA) default parameters for rural area were used. Receptors were set up according to DEQ modeling guidance. All regulated air pollutants and the TAPs that exceeded respective ELs were modeled. The concentrations of NO_2 were obtained by multiplying model results of NO_x by 0.75 as described in Section 16.7.2 of the application. All SO_x is considered as SO_2. The analyses presented in the application demonstrate compliance with the requirements for Tier II sources as required by IDAPA 58.01.01.403. The impact of carcinogenic TAPs was evaluated using cumulative risk.

Cumulative Risk = sum of Risk

where Risk = modeled concentration ($\mu g/m^3$) x Unit Risk Factor (URF risk/($\mu g/m^3$)).

The URF is listed in IDAPA58.01.01.586. The calculated cumulative risk is less than 1.0E-05. Although TAP Tier II permitting requirements for demonstrating compliance with IDAPA 58.01.01.161 have not been finalized, DEQ currently considers a risk increment of one in a hundred thousand to be a protective standard for facility-wide Tier II permitting and IDAPA 58.01.01.161. Since the acceptable ambient concentrations listed in IDAPA 58.01.01.586 are based on an excess risk of one in a million, a cumulative risk for the modeled TAP ambient concentrations was estimated. The cumulative risk estimate for the modeled TAP concentrations is between one in a hundred thousand and one in a million and therefore does not require further analysis at this time. The impact of non-carcinogenic TAPs concentrations were compared to ACC. All modeled maximum concentrations are below ACC. The results are summarized in Table 5 through Table 7.

Table 5. Modeled concentrations of criteria pollutants

Pollutant (MET[9] data Year)	Averaging Period	Result ($\mu g/m^3$)[1]	Location (UTME, UTMN)[7]	Background ($\mu g/m^3$)	Result + Background ($\mu g/m^3$)	NAAQS[2] ($\mu g/m^3$)
NO_2[3] (1989)	Annual	11.83	260,65	40	52	100
PM_{10}[4] (1991)	24-Hour	50.45	15, 225	86	136	150
PM_{10} (1988)	Annual	9.50	45, 270	32.7	42	50
SO_2[5] (1989)	3-Hour	424.93	205,-27.6	545	970	1,300
SO_2 (1989)	24-Hour	121.22	260, 65	144	265	365
SO_2 (1989)	Annual	11.95	260, 50	23.5	35	80
CO[6] (1989)	1-Hour	282.3	190, -75	11,450	11732	40,000
CO (1989)	8-Hour	81.5	240,25	5,130	5212	10,000
Lead[8]	24-Hour	0.0023	260,65	0.15	0.15	1.5(quarterly)[8]

1. Micrograms per cubic meter
2. National Ambient Air Quality Standard
3. Nitrogen dioxide
4. Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers
5. Sulfur dioxide
6. Carbon monoxide
7. Normalized Universal Transverse Mercator coordinates , East and North
8. 24-hour average is used to compare to the quarterly standard to evaluate the impact.
9. Meteorological

Table 6. Modeled carcinogenic TAPs[1] concentrations

Pollutant (MET[7] data Year)	Averaging Period	Result (µg/m³)[2]	Location (UTME, UTMN)[3]	URF[4]	Risk[5]
Arsenic (1989)	Annual	0.00018	260 50	4.3E-03	7.74E-07
Cadmium (1989)	Annual	0.00013	305 200	1.8E-03	2.34E-07
Chromium +6 (1989)	Annual	0.00003	260 50	1.2E-02	3.60E-07
HCOH (1989)	Annual	0.00855	305 200	1.3E-05	1.11E-07
Nickel (1989)	Annual	0.00649	260 50	2.4E-04	1.56E-06
Beryllium (1989)	Annual	0.00006	260 50	2.4E-04	1.44E-08
PAH (1989)	Annual	0.00144	260 50	3.3E-03	4.75E-06
Cumulative Risk[6]					**7.80E-06**

1. Toxic air pollutants
2. Micrograms per cubic meter
3. Universal Transverse Mercator coordinates, East and North, in meters
4. Unit Risk Factor, from US Environmental Protection Agency, IDAPA 58.01.01.586
5. Risk = concentration x URF
6. Cumulative Risk = sum of Risk, 1.0E-05 not to be exceeded
7. Meteorological

Table 7. Modeled non-carcinogenic TAPs[1] concentrations

Pollutant (MET[5] data Year)	Averaging Period	Result (µg/m³)[2]	Location (UTME, UTMN)[3]	ACC[4] (µg/m³)	Compliance
Cobalt (1989)	24-hour	9.2E-03	260 65	2.50E-00	Y
Fluoride (1989)	24-hour	5.2E-02	260 50	1.25E+02	Y
Phosphorus (1989)	24-hour	1.4E-02	260 65	5.0E-00	Y

1. Toxic air pollutants
2. Micrograms per cubic meter
3. Normalized Universal Transverse Mercator coordinates, East and North, in meters
4. Acceptable ambient concentrations, IDAPA 58.01.01.585
5. Meteorological

APPENDIX F

IDAHO SUPREME POTATOES, INC.

FIRTH FACILITY

COMBUSTION EVALUATION

Equipment	Fuel	dscfm at 3% O2	PM Emissions (lb/1,000 gal)	Fuel Usage (gal/hr)*	PM Emissions (lb/hr)	PM Emissions (gr/dscf)	Standard (gr/dscf)	Compliance (Y/N)
No. 4 Boiler	#2 Diesel	15971.2	3.3	650	2.145	0.016	0.050	Y
No. 4 Boiler	#4 Residual	16805	8.5	650	5.525	0.038	0.050	Y
No. 4 Boiler	#5 Residual	17103.3	11.5	650	7.475	0.051	0.050	N
No. 4 Boiler	#6 Residual	17282.1	9.32	650	6.058	0.041	0.050	Y
No. 4 Boiler	Natural Gas	24424.9	7.6	0.135	1.026	0.005	0.015	Y
No. 4 Boiler	Propane	3823.9	0.6	1050	0.63	0.019	0.050	Y
No. 3 Boiler	#2 Diesel	4914.2	3.3	200	0.66	0.016	0.050	Y
No. 3 Boiler	#4 Residual	5170.7	8.5	200	1.7	0.038	0.050	Y
No. 3 Boiler	#5 Residual	5262.5	11.5	200	2.3	0.051	0.050	N
No. 3 Boiler	#6 Residual	5317.6	9.32	200	1.864	0.041	0.050	Y
No. 3 Boiler	Natural Gas	7725.5	7.6	0.0427	0.32452	0.005	0.015	Y
No. 3 Boiler	Propane	1165.4	0.6	320	0.192	0.019	0.050	Y
Space Heater East	Natural Gas	2713.9	7.6	0.015	0.114	0.005	0.015	Y
Space Heater East	Propane	287.7	0.6	79	0.0474	0.019	0.050	Y
Space Heater North	Natural Gas	1452.7	7.6	0.00803	0.061028	0.005	0.015	Y
Space Heater North	Propane	153	0.6	42	0.0252	0.019	0.050	Y
Space Heater South	Natural Gas	1452.7	7.6	0.00803	0.061028	0.005	0.015	Y
Space Heater South	Propane	153	0.6	42	0.0252	0.019	0.050	Y
Misc Space Heaters	Natural Gas	363.7	7.6	0.00201	0.015276	0.005	0.015	Y
Misc Space Heaters	Propane	40.1	0.6	11	0.0066	0.019	0.050	Y
Fluidized Bed Dryer	Natural Gas	1233.1	7.6	0.00682	0.051832	0.005	0.015	Y
Fluidized Bed Dryer	Propane	284.1	0.6	78	0.0468	0.019	0.050	Y
Dryer Stage A	Natural Gas	1486.5	7.6	0.00822	0.062472	0.005	0.015	Y
Dryer Stage A	Propane	164.6	0.6	45.2	0.02712	0.019	0.050	Y
Dryer Stage B	Natural Gas	594.4	7.6	0.00329	0.025004	0.005	0.015	Y
Dryer Stage B	Propane	65.6	0.6	18	0.0108	0.019	0.050	Y
Dryer Stage C	Natural Gas	594.4	7.6	0.00329	0.025004	0.005	0.015	Y
Dryer Stage C	Propane	65.6	0.6	18	0.0108	0.019	0.050	Y
Secondary Dryer	Natural Gas	102.4	7.6	0.000565	0.004294	0.005	0.015	Y
Secondary Dryer	Propane	11.3	0.6	3.1	0.00186	0.019	0.050	Y

Combustion Evaluation - #4 Boiler, #2 Distillate

ISP

Fuel Data (% by weight)

S	0.5
N2	0.0
C	80.0
H2	17.0
H20	0.2
O2	0.2

Fuel burned (lb/hr)	4683.3
Excess air (%)	2
Stk temp (F)	463.65
Stk press (atm)	1

Combustion Air Required

	O2 lb.mole	N2 lb.mole
S	0.73	2.75
N2	0.00	0
C	336.93	1267.51
H2	147.61	555.28
O2	-0.29	
	484.98	1825.54

stioc. comb air = 2462.2609 lb.mole/hr

stoic. dry comb air = 2163.1976 lb.mole/hr

Flue Products

	lb.mole	lb/hr
SO2	0.73	46.75
N2	1862.38	52146.65
CO2	336.93	14825.01
H2O(comb)	297.43	5353.70
O2	9.70	310.38
H2O(fuel)	1.30	23.42
dry	2209.74	
wet	2508.47	

Volume of flue gas (acfm)	28194.5
Volume of flue gas (adcfm)	13984.1
Volume of flue gas (dscfm@7%O2)	20534.4
Volume of flue gas (dscfm@15%O2)	47913.5
Volume of flue gas (dscfm@8%O2)	22113.9
Volume of flue gas (dscfm@3%O2)	15971.2
Volume of flue gas (dscfm@10%O2)	26134.7

Combustion Evaluation - #4 Boiler, #4 Residual

ISP

Fuel Data (% by weight)

S	[illegible]
N2	[illegible]
C	[illegible]
H2	[illegible]
H20	[illegible]
O2	[illegible]

Fuel burned (lb/hr)	[illegible]
Excess air (%)	[illegible]
Stk temp (F)	466.56
Stk press (atm)	[illegible]

Combustion Air Required

	O2 lb.mole	N2 lb.mole
S	0.78	2.95
N2	0.00	0
C	360.04	1354.44
H2	148.31	557.93
O2	-0.77	
	508.37	1915.32

stioc. comb air = 2577.2572 lb.mole/hr

stoic. dry comb air = 2276.1401 lb.mole/hr

Flue Products

	lb.mole	lb/hr
SO2	0.78	50.13
N2	1954.50	54725.97
CO2	360.04	15841.83
H2O(comb)	298.84	5379.20
O2	10.17	325.36
H2O(fuel)	1.40	25.11
dry	2325.49	
wet	2625.73	

Volume of flue gas (acfm)	29512.5
Volume of flue gas (sdcfm)	14716.6
Volume of flue gas (dscfm@7%O2)	21606.5
Volume of flue gas (dscfm@15%O2)	50415.1
Volume of flue gas (dscfm@8%O2)	23268.5
Volume of flue gas (dscfm@3%O2)	16805.0
Volume of flue gas (dscfm@10%O2)	27499.2

Combustion Evaluation - #4 Boiler, #5 Residual

ISP

Fuel Data (% by weight)

S	[illegible]
N2	[illegible]
C	[illegible]
H2	[illegible]
H20	[illegible]
O2	[illegible]

Fuel burned (lb/hr)	[illegible]
Excess air (%)	[illegible]
Stk temp (F)	463.56
Stk press (atm)	[illegible]

Combustion Air Required

	O2 lb.mole	N2 lb.mole
S	0.80	3.02
N2	0.00	0
C	367.37	1382.02
H2	149.74	563.32
O2	-1.13	
	516.79	1948.36

stioc. comb air = 2620.9874 lb.mole/hr

stoic. dry comb air = 2316.5339 lb.mole/hr

Flue Products

	lb.mole	lb/hr
SO2	0.80	51.48
N2	1988.61	55681.21
CO2	367.37	16164.34
H2O(comb)	301.73	5431.16
O2	10.34	330.75
H2O(fuel)	1.43	25.79
dry	2367.13	
wet	2670.29	

Volume of flue gas (acfm)	30013.3
Volume of flue gas (sdcfm)	14980.1
Volume of flue gas (dscfm@7%O2)	21989.9
Volume of flue gas (dscfm@15%O2)	51309.8
Volume of flue gas (dscfm@8%02)	23681.5
Volume of flue gas (dscfm@3%02)	17103.3
Volume of flue gas (dscfm@10%02)	27987.2

Combustion Evaluation - #4 Boiler, #6 Residual

ISP

Fuel Data (% by weight)

S	[illegible]
N2	[illegible]
C	[illegible]
H2	[illegible]
H20	[illegible]
O2	[illegible]

Fuel burned (lb/hr)	[illegible]
Excess air (%)	[illegible]
Stk temp (F)	[illegible]
Stk press (atm)	[illegible]

Combustion Air Required

	O2 lb.mole	N2 lb.mole
S	0.83	3.13
N2	0.00	0
C	380.86	1432.75
H2	139.07	523.18
O2	-1.53	
	519.23	1959.07

stioc. comb air = 2624.2307 lb.mole/hr

stoic. dry comb air = 2340.7596 lb.mole/hr

Flue Products

	lb.mole	lb/hr
SO2	0.83	53.28
N2	2000.00	56000.10
CO2	380.86	16757.79
H2O(comb)	280.23	5044.22
O2	10.38	332.31
H2O(fuel)	1.48	26.69
dry	2392.08	
wet	2673.80	

Volume of flue gas (acfm)	30052.7
Volume of flue gas (sdcfm)	15138.0
Volume of flue gas (dscfm@7%O2)	22219.9
Volume of flue gas (dscfm@15%O2)	51846.4
Volume of flue gas (dscfm@8%O2)	23929.1
Volume of flue gas (dscfm@3%O2)	17282.1
Volume of flue gas (dscfm@10%O2)	28279.9

Combustion Evaluation - #4 Boiler, Natural Gas

ISP

Fuel Data (% by weight)

S	[illegible]
N2	[illegible]
C	[illegible]
H2	[illegible]
H20	[illegible]
O2	[illegible]

Fuel burned (lb/hr)	[illegible]
Excess air (%)	[illegible]
Stk temp (F)	463.56
Stk press (atm)	[illegible]

Combustion Air Required

	O2 lb.mole	N2 lb.mole
S	0.00	0.00
N2	0.00	0
C	400.60	1507.02
H2	372.31	1400.59
O2	-2.46	
	770.45	2907.60

stioc. comb air = 4060.1532 lb.mole/hr

stoic. dry comb air = 3308.2036 lb.mole/hr

Flue Products

	lb.mole	lb/hr
SO2	0.00	0.00
N2	2967.50	83090.13
CO2	400.60	17626.36
H2O(comb)	750.20	13503.63
O2	15.41	493.09
H2O(fuel)	0.00	0.00
dry	3383.51	
wet	4133.71	

Volume of flue gas (acfm)	46461.8
Volume of flue gas (sdcfm)	21412.2
Volume of flue gas (dscfm@7%O2)	31403.5
Volume of flue gas (dscfm@15%O2)	73274.7
Volume of flue gas (dscfm@8%O2)	33819.1
Volume of flue gas (dscfm@3%O2)	24424.9
Volume of flue gas (dscfm@10%O2)	39968.0

Combustion Evaluation - #4 Boiler, Propane

ISP

Fuel Data (% by weight)

S	0
N2	0
C	81.0
H2	19
H20	0
O2	0

Fuel burned (lb/hr)	1050
Excess air (%)	2
Stk temp (F)	463.56
Stk press (atm)	1

Combustion Air Required

	O2 lb.mole	N2 lb.mole
S	0.00	0.00
N2	0.00	0
C	71.51	269.01
H2	47.16	177.41
O2	0.00	
	118.67	446.42

stioc. comb air = 612.95314 lb.mole/hr

stoic. dry comb air = 517.92814 lb.mole/hr

Flue Products

	lb.mole	lb/hr
SO2	0.00	0.00
N2	455.35	12749.72
CO2	71.51	3146.42
H2O(comb)	95.03	1710.45
O2	2.37	75.95
H2O(fuel)	0.00	0.00
dry	529.23	
wet	624.25	

Volume of flue gas (acfm)	7016.5
Volume of flue gas (sdcfm)	3349.2
Volume of flue gas (dscfm@7%O2)	4916.5
Volume of flue gas (dscfm@15%O2)	11471.8
Volume of flue gas (dscfm@8%02)	5294.7
Volume of flue gas (dscfm@3%02)	3823.9
Volume of flue gas (dscfm@10%02)	6257.3

Combustion Evaluation - #3 Boiler, #2 Distillate

ISP

Fuel Data (% by weight)

S	0.5
N2	0.2
C	80
H2	7
H20	0
O2	0.2

Fuel burned (lb/hr)	1441.2
Excess air (%)	25
Stk temp (F)	560.78
Stk press (atm)	1

Combustion Air Required

	O2 lb.mole	N2 lb.mole
S	0.22	0.85
N2	0.00	0
C	103.67	390.00
H2	45.42	170.86
O2	-0.09	
	149.22	561.70

stioc. comb air = 757.61874 lb.mole/hr

stoic. dry comb air = 665.59926 lb.mole/hr

Flue Products

	lb.mole	lb/hr
SO2	0.22	14.39
N2	573.04	16045.12
CO2	103.67	4561.54
H2O(comb)	91.52	1647.29
O2	2.98	95.50
H2O(fuel)	0.40	7.21
dry	679.92	
wet	771.84	

Volume of flue gas (acfm)	9588.5
Volume of flue gas (sdcfm)	4302.8
Volume of flue gas (dscfm@7%O2)	6318.3
Volume of flue gas (dscfm@15%O2)	14742.6
Volume of flue gas (dscfm@8%02)	6804.3
Volume of flue gas (dscfm@3%02)	4914.2
Volume of flue gas (dscfm@10%02)	8041.4

Combustion Evaluation - #3 Boiler, #4 Residual

ISP

Fuel Data (% by weight)

S	[illegible]
N2	[illegible]
C	[illegible]
H2	[illegible]
H20	[illegible]
O2	[illegible]

Fuel burned (lb/hr)	[illegible]
Excess air (%)	[illegible]
Stk temp (F)	[illegible]
Stk press (atm)	[illegible]

Combustion Air Required

	O2 lb.mole	N2 lb.mole
S	0.24	0.91
N2	0.00	0
C	110.78	416.75
H2	45.63	171.67
O2	-0.24	
	156.42	589.32

stioc. comb air = 792.99431 lb.mole/hr

stoic. dry comb air = 700.34384 lb.mole/hr

Flue Products

	lb.mole	lb/hr
SO2	0.24	15.43
N2	601.38	16838.59
CO2	110.78	4874.36
H2O(comb)	91.95	1655.12
O2	3.13	100.11
H2O(fuel)	0.43	7.73
dry	715.53	
wet	807.91	

Volume of flue gas (acfm)	10036.6
Volume of flue gas (sdcfm)	4528.2
Volume of flue gas (dscfm@7%O2)	6648.1
Volume of flue gas (dscfm@15%O2)	15512.2
Volume of flue gas (dscfm@8%O2)	7159.5
Volume of flue gas (dscfm@3%O2)	5170.7
Volume of flue gas (dscfm@10%O2)	8461.2

Combustion Evaluation - #3 Boiler, #5 Residual

ISP

Fuel Data (% by weight)

S	[illegible]
N2	[illegible]
C	[illegible]
H2	[illegible]
H20	[illegible]
O2	[illegible]

Fuel burned (lb/hr)	[illegible]
Excess air (%)	[illegible]
Stk temp (F)	[illegible]
Stk press (atm)	[illegible]

Combustion Air Required

	O2 lb.mole	N2 lb.mole
S	0.25	0.93
N2	0.00	0
C	113.04	425.23
H2	46.07	173.33
O2	-0.35	
	159.01	599.49

stioc. comb air = 806.44983 lb.mole/hr

stoic. dry comb air = 712.77275 lb.mole/hr

Flue Products

	lb.mole	lb/hr
SO2	0.25	15.84
N2	611.88	17132.51
CO2	113.04	4973.60
H2O(comb)	92.84	1671.11
O2	3.18	101.77
H2O(fuel)	0.44	7.94
dry	728.34	
wet	821.62	

Volume of flue gas (acfm)	10206.9
Volume of flue gas (sdcfm)	4609.2
Volume of flue gas (dscfm@7%O2)	6766.1
Volume of flue gas (dscfm@15%O2)	15787.5
Volume of flue gas (dscfm@8%O2)	7286.5
Volume of flue gas (dscfm@3%O2)	5262.5
Volume of flue gas (dscfm@10%O2)	8611.4

Combustion Evaluation - #3 Boiler, #6 Residual

ISP

Fuel Data (% by weight)

S	[illegible]
N2	[illegible]
C	[illegible]
H2	[illegible]
H20	[illegible]
O2	[illegible]

Fuel burned (lb/hr)	[illegible]
Excess air (%)	[illegible]
Stk temp (F)	[illegible]
Stk press (atm)	[illegible]

Combustion Air Required

	O2 lb.mole	N2 lb.mole
S	0.26	0.96
N2	0.00	0
C	117.19	440.85
H2	42.79	160.98
O2	-0.47	
	159.76	602.79

stioc. comb air = 807.45559 lb.mole/hr

stoic. dry comb air = 720.23372 lb.mole/hr

Flue Products

	lb.mole	lb/hr
SO2	0.26	16.39
N2	615.39	17230.80
CO2	117.19	5156.24
H2O(comb)	86.23	1552.07
O2	3.20	102.25
H2O(fuel)	0.46	8.21
dry	736.02	
wet	822.71	

Volume of flue gas (acfm)	10220.4
Volume of flue gas (sdcfm)	4657.9
Volume of flue gas (dscfm@7%O2)	6836.9
Volume of flue gas (dscfm@15%O2)	15952.7
Volume of flue gas (dscfm@8%O2)	7362.8
Volume of flue gas (dscfm@3%O2)	5317.6
Volume of flue gas (dscfm@10%O2)	8701.5

Combustion Evaluation - #3 Boiler, Natural Gas

ISP

Fuel Data (% by weight)

S	0
N2	0
C	7
H2	2
H20	0
O2	1

Fuel burned (lb/hr)	2036.8
Excess air (%)	2
Stk temp (F)	560.78
Stk press (atm)	1

Combustion Air Required

	O2 lb.mole	N2 lb.mole
S	0.00	0.00
N2	0.00	0
C	126.71	476.67
H2	117.76	443.00
O2	-0.78	
	243.69	919.67

stioc. comb air = 1284.2177 lb.mole/hr

stoic. dry comb air = 1046.3777 lb.mole/hr

Flue Products

	lb.mole	lb/hr
SO2	0.00	0.00
N2	938.62	26281.23
CO2	126.71	5575.18
H2O(comb)	237.29	4271.17
O2	4.87	155.96
H2O(fuel)	0.00	0.00
dry	1070.20	
wet	1307.48	

Volume of flue gas (acfm)	16242.7
Volume of flue gas (sdcfm)	6772.6
Volume of flue gas (dscfm@7%O2)	9932.8
Volume of flue gas (dscfm@15%O2)	23176.6
Volume of flue gas (dscfm@8%O2)	10696.9
Volume of flue gas (dscfm@3%O2)	7725.5
Volume of flue gas (dscfm@10%O2)	12641.8

Combustion Evaluation - #3 Boiler, Propane

ISP

Fuel Data (% by weight)

S	[redacted]
N2	
C	
H2	
H20	
O2	

Fuel burned (lb/hr)	320
Excess air (%)	[redacted]
Stk temp (F)	660.78
Stk press (atm)	1

Combustion Air Required

	O2 lb.mole	N2 lb.mole
S	0.00	0.00
N2	0.00	0
C	21.79	81.98
H2	14.37	54.07
O2	0.00	
	36.17	136.05

stioc. comb air = 186.80477 lb.mole/hr

stoic. dry comb air = 157.84477 lb.mole/hr

Flue Products

	lb.mole	lb/hr
SO2	0.00	0.00
N2	138.77	3885.63
CO2	21.79	958.91
H2O(comb)	28.96	521.28
O2	0.72	23.15
H2O(fuel)	0.00	0.00
dry	161.29	
wet	190.25	

Volume of flue gas (acfm)	2363.4
Volume of flue gas (sdcfm)	1020.7
Volume of flue gas (dscfm@7%O2)	1498.4
Volume of flue gas (dscfm@15%O2)	3496.2
Volume of flue gas (dscfm@8%O2)	1613.6
Volume of flue gas (dscfm@3%O2)	1165.4
Volume of flue gas (dscfm@10%O2)	1907.0

Combustion Evaluation - Space Heater East, Propane

ISP

Fuel Data (% by weight)

S	0
N2	[illegible]
C	[illegible]
H2	[illegible]
H20	[illegible]
O2	[illegible]

Fuel burned (lb/hr)	79[illegible]
Excess air (%)	2[illegible]
Stk temp (F)	310.78
Stk press (atm)	1

Combustion Air Required

	O2 lb.mole	N2 lb.mole
S	0.00	0.00
N2	0.00	0
C	5.38	20.24
H2	3.55	13.35
O2	0.00	
	8.93	33.59

Flue Products

	lb.mole	lb/hr
SO2	0.00	0.00
N2	34.26	959.26
CO2	5.38	236.73
H2O(comb)	7.15	128.69
O2	0.18	5.71
H2O(fuel)	0.00	0.00
dry	39.82	
wet	46.97	

stioc. comb air = 46.117426 lb.mole/hr

stoic. dry comb air = 38.967926 lb.mole/hr

Volume of flue gas (acfm)	440.6
Volume of flue gas (sdcfm)	252.0
Volume of flue gas (dscfm@7%O2)	369.9
Volume of flue gas (dscfm@15%O2)	863.1
Volume of flue gas (dscfm@8%02)	398.4
Volume of flue gas (dscfm@3%02)	287.7
Volume of flue gas (dscfm@10%02)	470.8

Combustion Evaluation - Space Heater East, Natural Gas

ISP

Fuel Data (% by weight)

S	0
N2	0.76
C	77.21
H2	21.51
H20	0
O2	-0.47

Fuel burned (lb/hr)	715.6
Excess air (%)	2
Stk temp (F)	310.76
Stk press (atm)	1

Combustion Air Required

	O2 lb.mole	N2 lb.mole
S	0.00	0.00
N2	0.00	0
C	44.51	167.45
H2	41.37	155.62
O2	-0.27	
	85.61	323.07

stioc. comb air = 451.12813 lb.mole/hr

stoic. dry comb air = 367.57817 lb.mole/hr

Flue Products

	lb.mole	lb/hr
SO2	0.00	0.00
N2	329.72	9232.24
CO2	44.51	1958.48
H2O(comb)	83.36	1500.40
O2	1.71	54.79
H2O(fuel)	0.00	0.00
dry	375.95	
wet	459.30	

Volume of flue gas (acfm)	4308.4
Volume of flue gas (sdcfm)	2379.1
Volume of flue gas (dscfm@7%O2)	3489.3
Volume of flue gas (dscfm@15%O2)	8141.6
Volume of flue gas (dscfm@8%O2)	3757.7
Volume of flue gas (dscfm@3%O2)	2713.9
Volume of flue gas (dscfm@10%O2)	4440.9

Combustion Evaluation - Space Heater South & North, Natural Gas

ISP

Fuel Data (% by weight)

S	0
N2	0
C	74
H2	25
H20	0
O2	1

Fuel burned (lb/hr)	383
Excess air (%)	2
Stk temp (F)	310.78
Stk press (atm)	1

Combustion Air Required

	O2 lb.mole	N2 lb.mole
S	0.00	0.00
N2	0.00	0
C	23.83	89.63
H2	22.14	83.30
O2	-0.15	
	45.82	172.93

stioc. comb air = 241.48438 lb.mole/hr

stoic. dry comb air = 196.76092 lb.mole/hr

Flue Products

	lb.mole	lb/hr
SO2	0.00	0.00
N2	176.50	4941.92
CO2	23.83	1048.36
H2O(comb)	44.62	803.15
O2	0.92	29.33
H2O(fuel)	0.00	0.00
dry	201.24	
wet	245.86	

Volume of flue gas (acfm)	2306.3
Volume of flue gas (sdcfm)	1273.5
Volume of flue gas (dscfm@7%O2)	1867.8
Volume of flue gas (dscfm@15%O2)	4358.1
Volume of flue gas (dscfm@8%O2)	2011.4
Volume of flue gas (dscfm@3%O2)	1452.7
Volume of flue gas (dscfm@10%O2)	2377.2

Combustion Evaluation - Space Heater South & North, Propane

ISP

Fuel Data (% by weight)

S	0
N2	0
C	81.8
H2	18.2
H20	0
O2	0

Fuel burned (lb/hr)	42
Excess air (%)	2
Stk temp (F)	310.78
Stk press (atm)	1

Combustion Air Required

	O2 lb.mole	N2 lb.mole
S	0.00	0.00
N2	0.00	0
C	2.86	10.76
H2	1.89	7.10
O2	0.00	
	4.75	17.86

stioc. comb air = 24.518125 lb.mole/hr

stoic. dry comb air = 20.717125 lb.mole/hr

Flue Products

	lb.mole	lb/hr
SO2	0.00	0.00
N2	18.21	509.99
CO2	2.86	125.86
H2O(comb)	3.80	68.42
O2	0.09	3.04
H2O(fuel)	0.00	0.00
dry	21.17	
wet	24.97	

Volume of flue gas (acfm)	234.2
Volume of flue gas (sdcfm)	134.0
Volume of flue gas (dscfm@7%O2)	196.7
Volume of flue gas (dscfm@15%O2)	458.9
Volume of flue gas (dscfm@8%O2)	211.8
Volume of flue gas (dscfm@3%O2)	153.0
Volume of flue gas (dscfm@10%O2)	250.3

Combustion Evaluation - Misc Space Heaters, Natural Gas

ISP

Fuel Data (% by weight)

S	0
N2	0
C	74
H2	23
H20	0
O2	3

Fuel burned (lb/hr)	95.9
Excess air (%)	2
Stk temp (F)	310.78
Stk press (atm)	1

Combustion Air Required

	O2 lb.mole	N2 lb.mole
S	0.00	0.00
N2	0.00	0
C	5.97	22.44
H2	5.54	20.86
O2	-0.04	
	11.47	43.30

stioc. comb air = 60.465671 lb.mole/hr

stoic. dry comb air = 49.267291 lb.mole/hr

Flue Products

	lb.mole	lb/hr
SO2	0.00	0.00
N2	44.19	1237.42
CO2	5.97	262.50
H2O(comb)	11.17	201.10
O2	0.23	7.34
H2O(fuel)	0.00	0.00
dry	50.39	
wet	61.56	

Volume of flue gas (acfm)	577.5
Volume of flue gas (sdcfm)	318.9
Volume of flue gas (dscfm@7%O2)	467.7
Volume of flue gas (dscfm@15%O2)	1091.2
Volume of flue gas (dscfm@8%O2)	503.6
Volume of flue gas (dscfm@3%O2)	363.7
Volume of flue gas (dscfm@10%O2)	595.2

Combustion Evaluation - Misc Space Heaters, Propane

ISP

Fuel Data (% by weight)

S	0
N2	0
C	0
H2	0
H20	0
O2	0

Fuel burned (lb/hr)	1
Excess air (%)	2
Stk temp (F)	310.78
Stk press (atm)	1

Combustion Air Required

	O2 lb.mole	N2 lb.mole
S	0.00	0.00
N2	0.00	0
C	0.75	2.82
H2	0.49	1.86
O2	0.00	
	1.24	4.68

Flue Products

	lb.mole	lb/hr
SO2	0.00	0.00
N2	4.77	133.57
CO2	0.75	32.96
H2O(comb)	1.00	17.92
O2	0.02	0.80
H2O(fuel)	0.00	0.00
dry	5.54	
wet	6.54	

stioc. comb air = 6.4214138 lb.mole/hr

stoic. dry comb air = 5.4259138 lb.mole/hr

Volume of flue gas (acfm)	61.3
Volume of flue gas (adcfm)	35.1
Volume of flue gas (dscfm@7%O2)	51.5
Volume of flue gas (dscfm@15%O2)	120.2
Volume of flue gas (dscfm@8%O2)	55.5
Volume of flue gas (dscfm@3%O2)	40.1
Volume of flue gas (dscfm@10%O2)	65.6

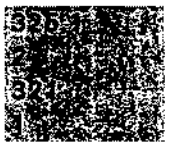
Combustion Evaluation - Fluidized Bed Dryer, Natural Gas

ISP

Fuel Data (% by weight)

S	
N2	
C	
H2	
H20	
O2	

Fuel burned (lb/hr)
Excess air (%)
Stk temp (F)
Stk press (atm)



Combustion Air Required

	O2 lb.mole	N2 lb.mole
S	0.00	0.00
N2	0.00	0
C	20.22	76.08
H2	18.80	70.71
O2	-0.12	
	38.90	146.79

stioc. comb air = 204.97799 lb.mole/hr

stoic. dry comb air = 167.0156 lb.mole/hr

Flue Products

	lb.mole	lb/hr
SO2	0.00	0.00
N2	149.82	4194.83
CO2	20.22	889.87
H2O(comb)	37.87	681.73
O2	0.78	24.89
H2O(fuel)	0.00	0.00
dry	170.82	
wet	208.69	

Volume of flue gas (acfm)	1983.6
Volume of flue gas (sdcfm)	1081.0
Volume of flue gas (dscfm@7%O2)	1585.4
Volume of flue gas (dscfm@15%O2)	3699.3
Volume of flue gas (dscfm@8%02)	1707.4
Volume of flue gas (dscfm@3%02)	1233.1
Volume of flue gas (dscfm@10%02)	2017.8

Combustion Evaluation - Fluidized Bed Dryer, Propane

ISP

Fuel Data (% by weight)

S	[illegible]
N2	[illegible]
C	[illegible]
H2	[illegible]
H20	[illegible]
O2	[illegible]

Fuel burned (lb/hr)	78
Excess air (%)	2
Stk temp (F)	321
Stk press (atm)	1

Combustion Air Required

	O2 lb.mole	N2 lb.mole
S	0.00	0.00
N2	0.00	0
C	5.31	19.98
H2	3.50	13.18
O2	0.00	
	8.82	33.16

stioc. comb air = 45.533662 lb.mole/hr

stoic. dry comb air = 38.474662 lb.mole/hr

Flue Products

	lb.mole	lb/hr
SO2	0.00	0.00
N2	33.83	947.12
CO2	5.31	233.73
H2O(comb)	7.06	127.06
O2	0.18	5.64
H2O(fuel)	0.00	0.00
dry	39.31	
wet	46.37	

Volume of flue gas (acfm)	440.8
Volume of flue gas (sdcfm)	248.8
Volume of flue gas (dscfm@7%O2)	365.2
Volume of flue gas (dscfm@15%O2)	852.2
Volume of flue gas (dscfm@8%02)	393.3
Volume of flue gas (dscfm@3%02)	284.1
Volume of flue gas (dscfm@10%02)	464.8

Combustion Evaluation - Dryers Stage A, Natural Gas

ISP

Fuel Data (% by weight)

S	0
N2	0
C	2.77
H2	0
H20	0
O2	0

Fuel burned (lb/hr)	391.91
Excess air (%)	2
Stk temp (F)	366.83
Stk press (atm)	1

Combustion Air Required

	O2 lb.mole	N2 lb.mole
S	0.00	0.00
N2	0.00	0
C	24.38	91.72
H2	22.66	85.24
O2	-0.15	
	46.89	176.95

stioc. comb air = 247.0959 lb.mole/hr

stoic. dry comb air = 201.33317 lb.mole/hr

Flue Products

	lb.mole	lb/hr
SO2	0.00	0.00
N2	180.60	5056.76
CO2	24.38	1072.72
H2O(comb)	45.66	821.81
O2	0.94	30.01
H2O(fuel)	0.00	0.00
dry	205.92	
wet	251.57	

Volume of flue gas (acfm)	2529.9
Volume of flue gas (sdcfm)	1303.1
Volume of flue gas (dscfm@7%O2)	1911.2
Volume of flue gas (dscfm@15%O2)	4459.4
Volume of flue gas (dscfm@8%O2)	2058.2
Volume of flue gas (dscfm@3%O2)	1486.5
Volume of flue gas (dscfm@10%O2)	2432.4

Combustion Evaluation - Dryer A, Propane

ISP

Fuel Data (% by weight)

S	[redacted]
N2	
C	
H2	
H20	
O2	

Fuel burned (lb/hr)	[redacted]
Excess air (%)	
Stk temp (F)	
Stk press (atm)	

Combustion Air Required

	O2 lb.mole	N2 lb.mole
S	0.00	0.00
N2	0.00	0
C	3.08	11.58
H2	2.03	7.64
O2	0.00	
	5.11	19.22

stioc. comb air = 26.386173 lb.mole/hr

stoic. dry comb air = 22.295573 lb.mole/hr

Flue Products

	lb.mole	lb/hr
SO2	0.00	0.00
N2	19.60	548.84
CO2	3.08	135.45
H2O(comb)	4.09	73.63
O2	0.10	3.27
H20(fuel)	0.00	0.00
dry	22.78	
wet	26.87	

Volume of flue gas (acfm)	270.2
Volume of flue gas (sdcfm)	144.2
Volume of flue gas (dscfm@7%O2)	211.6
Volume of flue gas (dscfm@15%O2)	493.8
Volume of flue gas (dscfm@8%O2)	227.9
Volume of flue gas (dscfm@3%O2)	164.6
Volume of flue gas (dscfm@10%O2)	269.4

Combustion Evaluation - Dryers Stage B & C, Natural Gas

ISP

Fuel Data (% by weight)

S	[illegible]
N2	[illegible]
C	[illegible]
H2	[illegible]
H20	[illegible]
O2	[illegible]

Fuel burned (lb/hr)	[illegible]
Excess air (%)	[illegible]
Stk temp (F)	366.33
Stk press (atm)	[illegible]

Combustion Air Required

	O2 lb.mole	N2 lb.mole
S	0.00	0.00
N2	0.00	0
C	9.75	36.67
H2	9.06	34.08
O2	-0.06	
	18.75	70.75

stioc. comb air = 98.800528 lb.mole/hr

stoic. dry comb air = 80.502445 lb.mole/hr

Flue Products

	lb.mole	lb/hr
SO2	0.00	0.00
N2	72.21	2021.93
CO2	9.75	428.92
H2O(comb)	18.26	328.60
O2	0.37	12.00
H2O(fuel)	0.00	0.00
dry	82.34	
wet	100.59	

Volume of flue gas (acfm)	1011.6
Volume of flue gas (adcfm)	521.0
Volume of flue gas (dscfm@7%O2)	764.2
Volume of flue gas (dscfm@15%O2)	1783.1
Volume of flue gas (dscfm@8%O2)	823.0
Volume of flue gas (dscfm@3%O2)	594.4
Volume of flue gas (dscfm@10%O2)	972.6

Combustion Evaluation - Dryers B & C, Propane

ISP

Fuel Data (% by weight)

S	[redacted]
N2	
C	
H2	
H20	
O2	

Fuel burned (lb/hr) [redacted]
Excess air (%)
Stk temp (F)
Stk press (atm)

Combustion Air Required

	O2 lb.mole	N2 lb.mole
S	0.00	0.00
N2	0.00	0
C	1.23	4.61
H2	0.81	3.04
O2	0.00	
	2.03	7.65

stioc. comb air = 10.507768 lb.mole/hr
stoic. dry comb air = 8.8787681 lb.mole/hr

Flue Products

	lb.mole	lb/hr
SO2	0.00	0.00
N2	7.81	218.57
CO2	1.23	53.94
H2O(comb)	1.63	29.32
O2	0.04	1.30
H2O(fuel)	0.00	0.00
dry	9.07	
wet	10.70	

Volume of flue gas (acfm)	107.6
Volume of flue gas (sdcfm)	57.4
Volume of flue gas (dscfm@7%O2)	84.3
Volume of flue gas (dscfm@15%O2)	196.7
Volume of flue gas (dscfm@8%O2)	90.8
Volume of flue gas (dscfm@3%O2)	65.6
Volume of flue gas (dscfm@10%O2)	107.3

Combustion Evaluation - Secondary Dryer, Natural Gas

ISP

Fuel Data (% by weight)

S	0
N2	0
C	7
H2	6
H20	[illegible]
O2	[illegible]

Fuel burned (lb/hr)	[illegible]
Excess air (%)	[illegible]
Stk temp (F)	293
Stk press (atm)	1

Combustion Air Required

	O2 lb.mole	N2 lb.mole
S	0.00	0.00
N2	0.00	0
C	1.68	6.32
H2	1.56	5.87
O2	-0.01	
	3.23	12.19

stioc. comb air = 17.023703 lb.mole/hr

stoic. dry comb air = 13.870874 lb.mole/hr

Flue Products

	lb.mole	lb/hr
SO2	0.00	0.00
N2	12.44	348.39
CO2	1.68	73.91
H2O(comb)	3.15	56.62
O2	0.06	2.07
H2O(fuel)	0.00	0.00
dry	14.19	
wet	17.33	

Volume of flue gas (acfm)	158.8
Volume of flue gas (sdcfm)	89.8
Volume of flue gas (dscfm@7%O2)	131.7
Volume of flue gas (dscfm@15%O2)	307.2
Volume of flue gas (dscfm@8%02)	141.8
Volume of flue gas (dscfm@3%02)	102.4
Volume of flue gas (dscfm@10%02)	167.6

Combustion Evaluation - Secondary Dryer, Propane

ISP

Fuel Data (% by weight)

S	[redacted]
N2	
C	
H2	
H20	
O2	

Fuel burned (lb/hr)	[redacted]
Excess air (%)	
Stk temp (F)	
Stk press (atm)	

Combustion Air Required

	O2 lb.mole	N2 lb.mole
S	0.00	0.00
N2	0.00	0
C	0.21	0.79
H2	0.14	0.52
O2	0.00	
	0.35	1.32

stioc. comb air = 1.8096712 lb.mole/hr

stoic. dry comb air = 1.5291212 lb.mole/hr

Flue Products

	lb.mole	lb/hr
SO2	0.00	0.00
N2	1.34	37.64
CO2	0.21	9.29
H2O(comb)	0.28	5.05
O2	0.01	0.22
H2O(fuel)	0.00	0.00
dry	1.56	
wet	1.84	

Volume of flue gas (acfm)	16.9
Volume of flue gas (sdcfm)	9.9
Volume of flue gas (dscfm@7%O2)	14.5
Volume of flue gas (dscfm@15%O2)	33.9
Volume of flue gas (dscfm@8%O2)	15.6
Volume of flue gas (dscfm@3%O2)	11.3
Volume of flue gas (dscfm@10%O2)	18.5